DOCUMENT RESUME

ED 342 939 CE 060 493

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TITLE	Graphic Arts/Offset Lithography.
INSTITUTION	Missouri Univ., Columbia. Instructional Materials Lab.
SPONS AGENCY	Missouri State Dept. of Elementary and Secondary Education, Jefferson City. Div. of Vocational and Adult Education.
PUB DATE	Jun 88
NOTE	1,178p.
AVAILABLE FROM	Instructional Materials Laboratory, University of Missouri, 2316 Industrial Drive, Columbia, MO 65202 (order no. 70-8000-I: $82.00).
PUB TYPE	Guides - Classroom Use - Teaching Guides (For Teacher) (052)
EDRS PRICE	MF09 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	Competence; Competency Based Education; Course Content; *Entry Workers; *Graphic Arts; *Job Skills; Lesson Plans; Photocomposition; Postsecondary Education; *Printing; Secondary Education; Teaching Methods; Units of Study; Vocational Education

ABSTRACT

This revised curriculum for graphic arts is designed to provide secondary and postsecondary students with entry-level skills and an understanding of current printing technology. It contains lesson plans based on entry-level competencies for offset lithography as identified by educators and industry representatives. The guide is divided into 15 units that consist of one or more lessons. Each lesson contains the following components: scope, lesson objectives, information assignment, references, introduction, outline, summary and conclusion, interaction items, classroom and laboratory activities, evaluation items, and transparency masters. Units cover the following topics: processing job orders; preparing customer layouts; typesetting; producing camera-ready copy; exposing with a camera; processing photographic material; contacting; performing film image assembly; making proofs; image carriers; offset press; finishing operations; paper handling; packaging and preparing for mailing; and specialty operations. A 27-item bibliography is included in the guide. (KC)

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GRAPHIC ARTS

OFFSET LITHOGRAPHY

Mr. James Hoisington

Dr. Joseph Metcalf

Produced by the Instructional Materials Laboratory
University of Missouri-Columbia
Columbia, Missouri
June 1988

Catalog Number IE-57-I

"The activity which is the subject of this report was supported in whole or in part by funds from the Department of Elementary and Secondary Education, Division of Vocational and Adult Education. However, the opinions expressed herein do not necessarily reflect the position or policies of the Missouri Department of Elementary and Secondary Education or the Division of Vocational and Adult Education, and no official endorsement should be inferred."

ACKNOWLEDGMENTS

Appreciation is expressed to the many individuals who gave their time, knowledge, and talents to the revision of this curriculum guide. Without their cooperation this project would not have been made possible.

A special thanks is extended to the following persons for:

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PREFACE

This revised edition of Graphic Arts - Offset Lithography is the result of the combined efforts of many dedicated individuals, including representatives from the printing industry and vocational graphic arts educators. The revision of this curriculum guide, which was funded by the Department of Elementary and Secondary Education for use in secondary and postsecondary vocational graphic arts programs, is an important step forward in an effort to provide offset lithography students with entry-level skills and an understanding of printing technology as it now exists in the industry.

The lesson plans included in this guide are based on entry-level competencies for offset lithography as identified by the project advisory committee and validated by members of the printing industry. The project writers designed lessons that will realistically meet the needs of the both the graphic arts instructor and student, regardless of the size and/or scope of a particular program. Flexibility is built into the lesson plans to allow for this variance.

The curriculum guide is divided into units of instruction which consist of one or more lessons. The instructor is able to utilize the lesson plans as short manageable segments. Each lesson contains the following components:

SCOPE OF UNIT

A teacher-centered statement that includes the goals of the unit; allows the reader to see the comprehensive content of each lesson

LESSON OBJECTIVES

A listing of skills the student will be able to perform as a result of the lesson; provides the basis for evaluation

INFORMATION ASSIGNMENT

An assignment for which the student is responsible

REFERENCES

Resources the instructor uses to support the unit content

INTRODUCTION

A statement that sets the stage for learning of the content; tells the student why the lesson is important

OUTLINE

The content of the lesson; may be informative in nature or it may be the steps of a procedure to learn a skill

SUMMARY AND CONCLUSION

Reassimilates all of the information that was included in the content of the lesson; ties all of the information together in a comprehensive overview; purpose is to reinforce learning by summarizing the major components of the lesson

INTERACTION ITEMS

Questions intended to stimulate and encourage student interaction during the lesson presentation; allow the instructor build on students' previous learning as well as dispel any misconceptions

CLASSROOM/LABORATORY ACTIVITIES

Activities designed to reinforce learning; allow students to interact with the new information or materials contained in the lesson

EVALUATION ITEMS

An exercise designed to measure the accomplishment of the lesson objectives; may be written evaluation or skills demonstration

The curriculum guide becomes individualized when the instructor includes his/her program's philosophy and unique teaching style. Additional content may be added to increase the scope of the unit if it better serves individual programs.

GRAPHIC ARTS - OFFSET LITHOGRAPHY

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69. Putting Plate on the Press	69. Putting Plate on the Press
70. Press Maintenance	
71. Paper Cutter Safety	71. Paper Cutter Safety
72. Paper Cutting	
73. Folding	
74. Collating	
75. Binding	
76. Book Binding	
PAPER HANDLING	
77. Paper	
78. Figuring Paper	
79. Paper Storage	
80. Conditioning Paper	
81. Inventory	

INFORMATION	DEMONSTRATION
PACKAGING AND PREPARING FOR MAILING	
82. Packaging	
83. Ink Jet Printing	
84. Delivery	
SPECIALTY OPERATIONS	
85. Numbering	
86. Die Cutting	86. Die Cutting
87. Perforating/Scoring	87. Perforating/Scoring
88. Thermography/Laminating	88. Thermography/Laminating
89. Preventive Maintenance	89. Preventive Maintenance

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

SCOPE OF UNIT:

This unit includes, by way of introduction, basic knowledge of the printing processes with special emphasis towards offset lithography, its historical past and its technological development. This unit covers production planning, cost estimating, costing, cost accounting, scheduling, production control, purchasing, and inventory as these topics relate to the processing of the job order.

INFORMATION TOPIC: I-1 OR DEMONSTRATION:

INTRODUCTION TO THE PRINTING PROCESSES
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify the image transfer principles of each of the four major printing processes.
2. Identify, from printed samples, by which process each was printed.
3. Identify typical products printed by each of the four major commercial printing processes.
4. Identify image carriers of each process from samples provided by the instructor.
5. List characteristics unique to each printing process.
6. Diagram each of the four major printing processes.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. TM 1: Relief Image Transfer
2. TM 2: Modern Letterpress
3. TM 3: Flexography
4. TM 4: Planographic Image Transfer

5. TM 5: Offset Lithography Image Transfer
6. TM 6: Intaglio Image Transfer
7. TM 7: Gravure Image Transfer
8. TM 8: Stencil Image Transfer
9. TM 9: Screen Printing Image Transfer
10. HO 1: Printing Methods
11. AS 1: Image Transfer Processes
12. Video Tape GA-88-100: Introduction to the Graphic Arts Industry. Available from The Media Center, State Fair Community College, 1900 Clarendon Rd., Sedalia, MO 65301 (816)826-7100
13. Selection of a variety of commercially-printed samples (to include all of the major commercial processes)
14. Representative image carrier samples of the four major printing processes

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 1, unit 5, pp. 10-13.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch. 1.

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 18.

REFERENCES:

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts Instructor's Guide, 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 1, unit 5, p. 17.

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 4.

Struss, Victor. The Printing Industry. Washington, DC: Printing Industries of America, 1967, ch. 1.

Blair, Raymond N., ed. The Lithographer's Manual. 7th ed. Pittsburgh, PA: The Graphic Arts Technical Foundation, 1983.

INTRODUCTION:

There are several traditional and modern image transfer processes. The developmental principles and capabilities of these should be thoroughly understood to enable one to design and plan a production project. This background is basic to cost estimating, scheduling, and costing.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

OUTLINE: (Key Points)

NOTE: Most reproduction processes use the same pre-press techniques up to the point of assembling the negatives. A noted exception is traditional letterpress (printing directly from type) which is rapidly fading from the graphic communications scene. The differences in the processes are first evident in the image carriers (plates) and the ways in which they are prepared for printing. The major difference in each process is how the images are transferred from the carriers. The four processes under consideration in this unit are relief, planography (lithography), intaglio, and stencil (screen printing). There are educators who consider other image transfer methods when studying the processes, most notably electrostatic and photographic. These processes, as yet, have not had the commercial impact to the graphic communications industry equivalent to the traditional four.

I. Introduction to Image Transfer Processes (HO 1)

  A. Relief - printing from a raised image surface (TM 1)

    1. Commercial methods

      a. Letterpress (TM 2)

      b. Flexography - "flexo" (TM 3)

      c. Indirect - "dry offset" or letterset

      d. Wraparound

    2. Commercial products

      a. Letterpress

        (1) Imprints

        (2) Crash printing

        (3) Numbering

        (4) Carton printing

        (5) Short runs with changes

        (6) Packaging

b. Flexography

(1) Pressure-sensitive items (labels)

(2) Foil and plastic packaging

(3) Bags and boxes

(4) Newspapers and inexpensive books

B. Planography (offset lithography) - printing from a flat surface (planography) using the principle of oil and water do not mix (TM 4)

1. Commercial methods

a. Direct lithography

b. Offset lithography (TM 5)

2. Commercial products

a. Business and financial printing

b. Short-run publications

c. Short-run packaging and labels

d. Advertising displays

e. Brochures, broadsides, booklets

f. Newspapers

g. Books

C. Intaglio - printing from a "recessed" image surface (TM 6)

1. Commercial methods

a. Steel plate engraving

b. Copper plate engraving

c. Gravure (TM 7)

(1) Rotogravure

(2) Sheet-fed gravure

2. Commercial products

a. Steel plate engraving

(1) Currency, bonds

(2) Postage stamps

b. Copper plate engraving

(1) Business cards

(2) Invitations

(3) Letterheads and envelopes

c. Gravure

(1) Rotogravure

(a) Long-run publications

(b) Long-run advertising

(c) Long-run packaging

(d) Newspaper inserts

(e) Simulated wood paneling and paper

(f) Gift wrap

(2) Sheet-fed gravure

(a) Not of significant use in USA

(b) Used in Europe for medium-run publications and advertising; competitive to offset litho-graphy

D. Stencil (screen printing) - printing from or through a porous or stencil image; uses a tightly stretched web of fabric or fibers to suspend the image-carrying stencil (TM 8)

1. Commercial methods

a. Screen printing (TM 9)

b. Mimeograph

2. Commercial products

a. Screen printing

(1) Fabrics

(2) Wood, glass, or other unusual substrate

        (3) Oversized or extra large objects

        (4) Pressure sensitives - labels, etc.

        (5) Signs, outdoor advertising

        (6) Unusual shapes

        (7) Products requiring heavy ink coverage

    b. Mimeograph - process used for short-run duplication in offices and schools; has essentially been replaced by electrostatic copying

II. Identifying the Processes

A. Relief - letterpress/flexography

1. Letterpress is typically printed on smooth, coated stock; used mainly for imprinting, crash printing and numbering (although it is making a comeback for long-run, multicolor labeling because the inks are heavier and are able to carry a richer color than flexo).

2. Flexography is typically printed on unusual substrates such as foils and films; colors are usually transparent and "watery."

3. Letterpress and flexo have distinct ink squeeze-out patterns around hard edge of image (footprint); flexo is often more pronounced because of the resilient plate which tends to "squeegee" out the ink. Flexo ink is typically thinner than letterpress. Advancing technology is making the visual differences between the two processes less distinct.

B. Offset lithography

1. Because the image is transferred from a planographic (flat) surface, there is no distinctive squeeze-out or footprint as with other processes. The hard edge of an image will be sharp and clean.

2. Because the ink is transferred three times, the printed image is very thin and it is not uncommon to be able to see the paper fibers through the image. Offset inks are very pigment-intensive and cover most surfaces well due to the image transfer from a resilient blanket.

C. Intaglio

1. Engraved image has slightly raised image; reverse side will be slightly embossed and burnished around image. Process reproduces light, delicate lines exceptionally well.

2. Gravure uses a grid image of very small indentations to carry the image ink. Solids, therefore, will carry a saw-toothed edge which is particularly evident in type. Gravure illustrations will often not show half-tone dots but will just look "grainy" due to this grid of ink reservoirs.

3. Color illustrations show good color tone and natural renditions.

D. Screen printing

1. Look for fine, straight lines; often become dashed lines due to screen break-up of image; the same is true for fine image detail.

2. Look for saw-toothed edge as the edge angle of image approaches 45° of screen angle.

3. Image surface of heavy solids may show screen patterns.

4. Screen printing typically found in products with:

   a. Unusual substrates

   b. Unusual shapes

   c. Unusual sizes (large)

   d. Heavy, dense, or opaque ink coverage

III. Summary and Conclusion

A. Introduction to image transfer processes

B. Identifying the processes

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

INTERACTION ITEMS:

1. What common, everyday item is produced by a process other than offset lithography?

2. What are some other printed products that you think are not produced by offset lithography?

3. Why should one study all of the processes in a course about offset lithography?

4. Why do you need to understand the principles of each process in order to identify the products of the process?

5. If you were working as an estimator for an offset printing company, would you need to understand all of the processes? Why?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Examine, with class, printed product samples using a magnifier. Sitting around a table, discuss the features of each sample that helps to identify the process. Discuss if this process was a wise selection for this product.

2. Show image carrier example(s) in discussion with class. Have students identify the differences in each process and discuss how the image carrier is a factor in the distinguishing features of the printed product.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

EVALUATION ITEMS:

For each of the following statements or questions, write the letter of the correct response in the blank provided.

_____ 1. Which principle best describes the process of relief printing?

a. Oil and water do not mix
b. Printing from a stencil image
c. An image carrier with the image raised above the non-image area
d. A planographic image carrier
e. An image carrier with the image recessed below the non-image area

_____ 2. Unusual shape, heavy ink coverage, unusual substrate and large objects are all descriptive and unique to the process of:

a. Letterpress printing
b. Screen printing
c. Intaglio printing
d. Offset lithography
e. Gravure

_____ 3. Long-run publications, long-run packaging, newspaper inserts, and gift wrap are products typically produced by:

a. Offset lithography
b. Screen printing
c. Letterpress
d. Steel plate engraving
e. Gravure

_____ 4. Flexography and letterpress are similar in that they both:

a. Are used to print unusual substrate, and shapes
b. Use the principle that oil and water do not mix
c. Use an image carrier with a raised image
d. Are used to print long-run publications
e. Are used for one-sided, short-run items such as business cards

_____ 5. Paper currency, in this country, is printed by:

a. Offset lithography
b. Steel plate engraving
c. Screen printing
d. Flexography
e. Mimeograph

Complete the following sentences by writing the best answer in the space provided.

6. Water prevents the greasy ink from spreading to the non-image area on a _______________ plate.

7. Two differences between flexography and letterpress are the ____________ and the _____________.

8. The most distinctive identifying characteristic of a product produced by relief printing is the _______________.

9. Products made of metallic foils and plastic films are best printed by ____________ or _____________.

10. Cigarette packages, whiskey labels, and the *National Geographic* are all long-run, nationally distributed products. An expert would expect these products to be printed by the ____________ process.

Select the process on the right which best fits the characteristic on the left. You may match a process more than once.

11.	_______	Raised image	a. Offset lithography
12.	_______	Oil and water	b. Flexography
13.	_______	Planographic	c. Copper plate
14.	_______	Heavy ink coverage	d. Letterpress
15.	_______	Foil and film substrate	e. Screen printing
16.	_______	Recessed image	f. Gravure
17.	_______	T-shirt printing	g. Relief
18.	_______	Unusual substrate shape	
19.	_______	Long-run packages	
20.	_______	Advertising brochures	

LESSON PLAN: 1

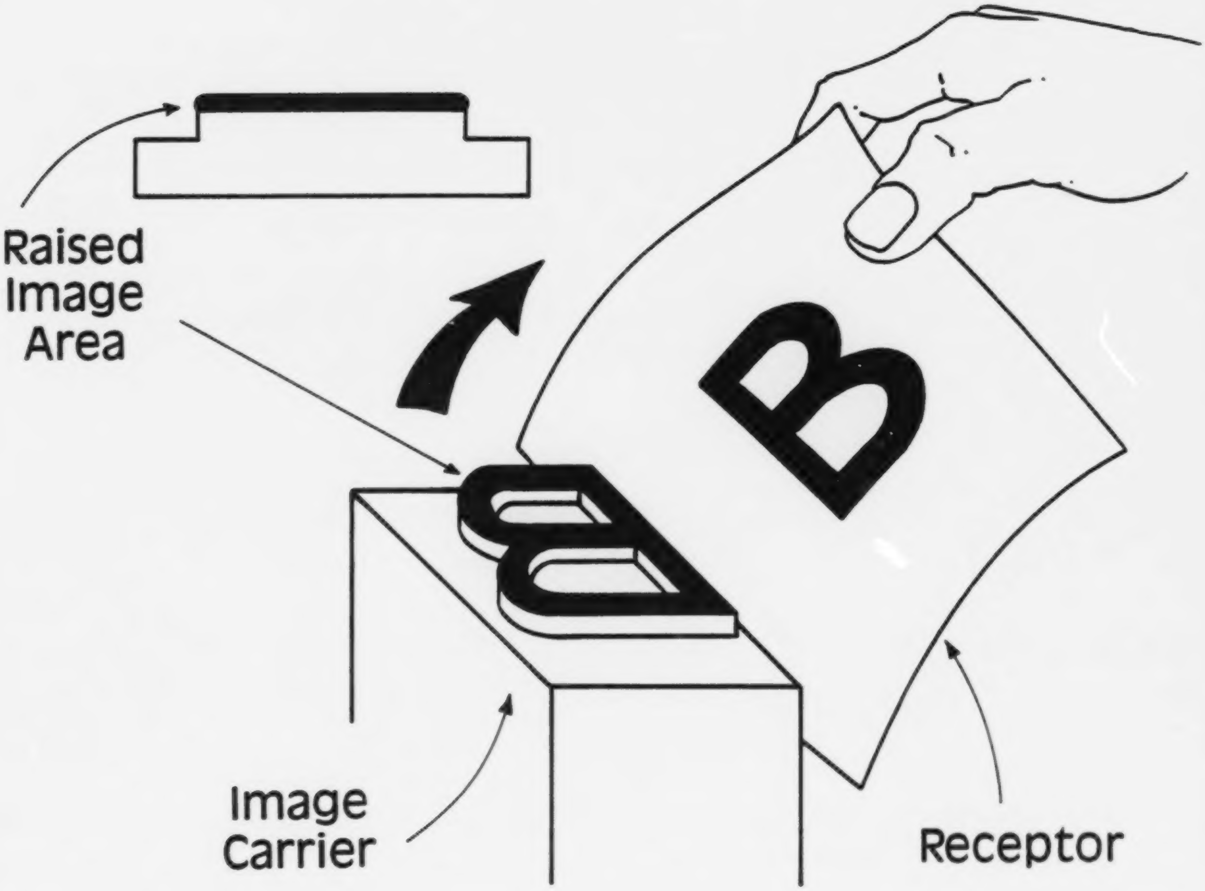
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

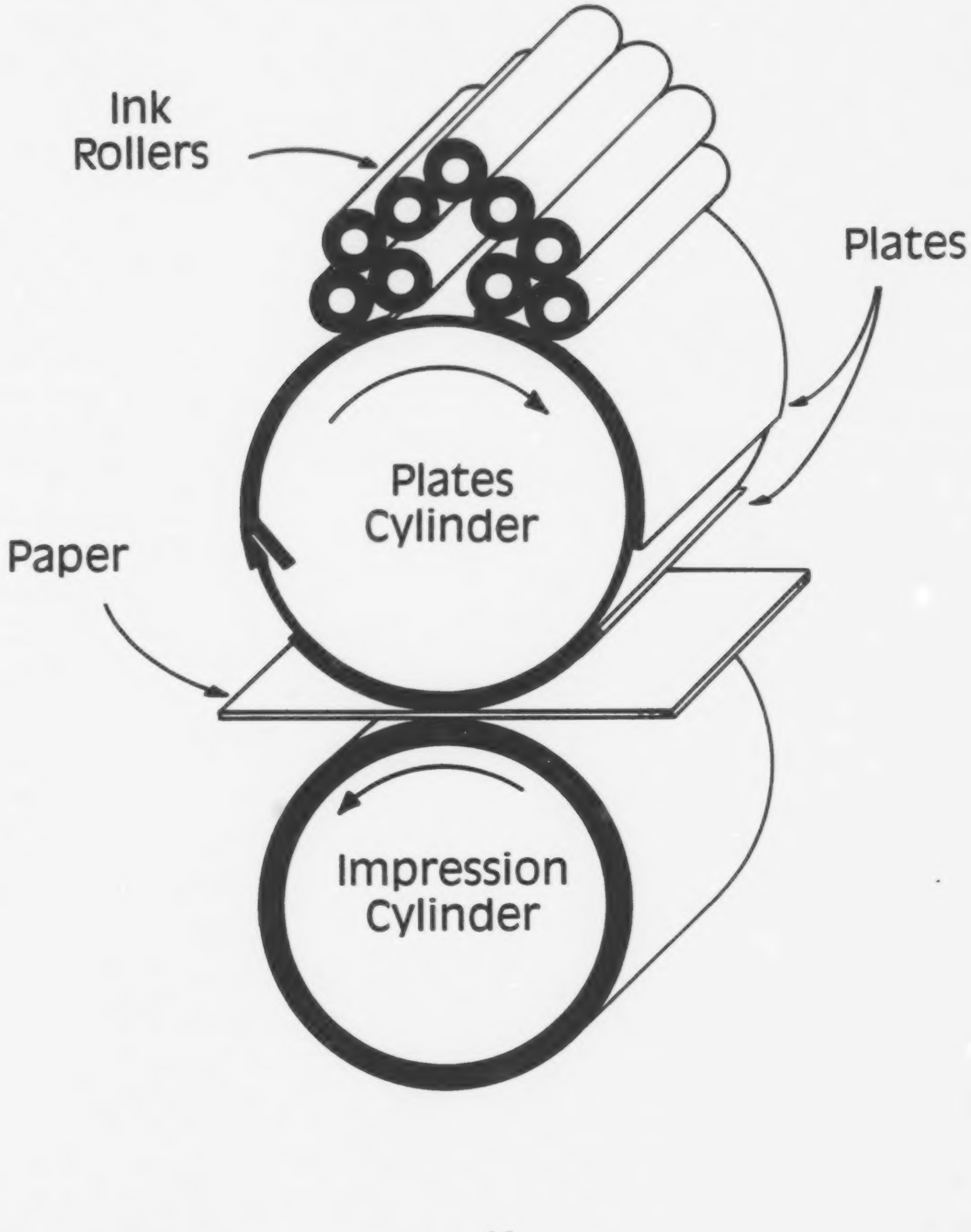
ANSWERS TO EVALUATION ITEMS:

1. c
2. b
3. e
4. c
5. b
6. lithographic (or offset)
7. plate, ink system
8. ink squeeze-out
9. flexography or screen printing
10. gravure
11. g
12. a
13. a
14. e
15. b or e
16. f
17. e
18. e
19. f
20. a

Relief Image Transfer


Raised
Image
Area
B
Image
Carrier
Receptor

Modern Letterpress


Ink Rollers
Plates
Plates Cylinder
Paper
Impression Cylinder

Flexography

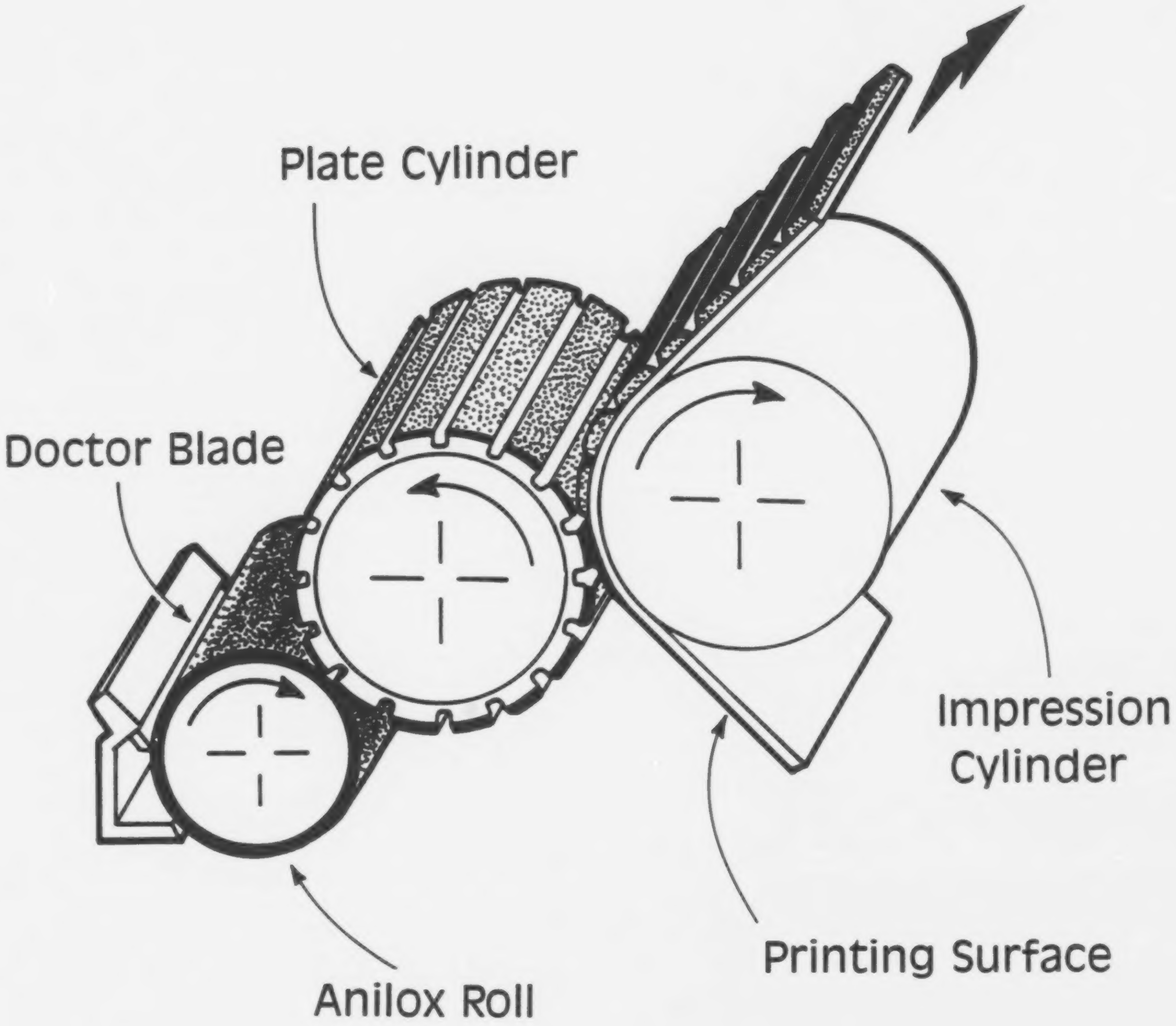
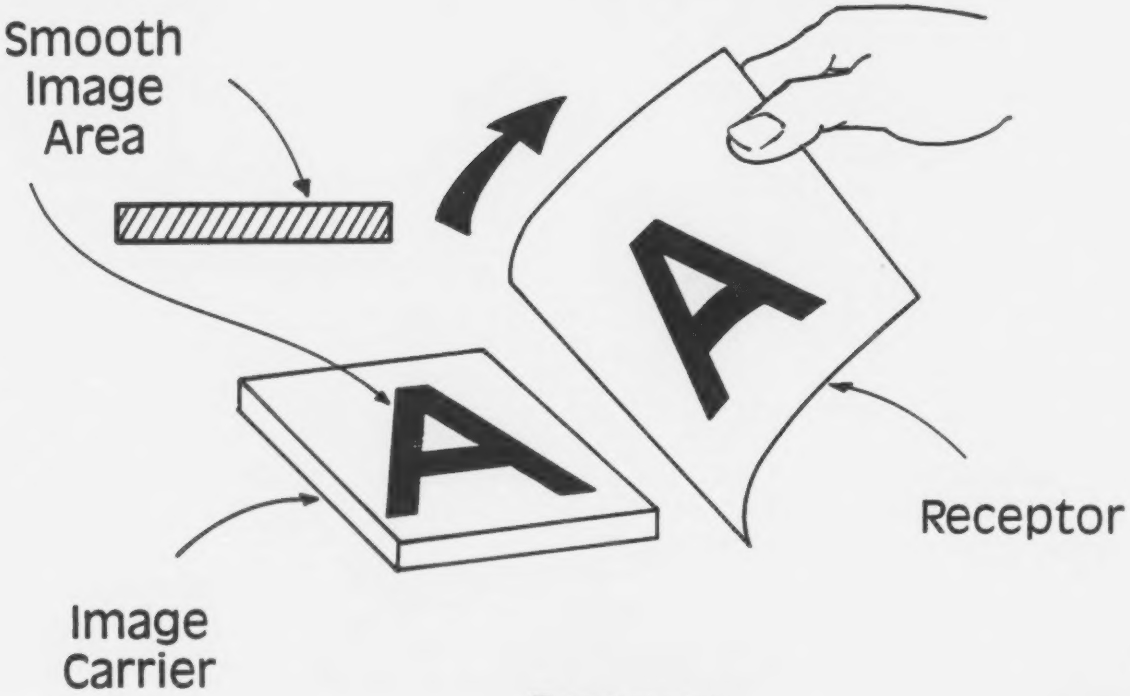
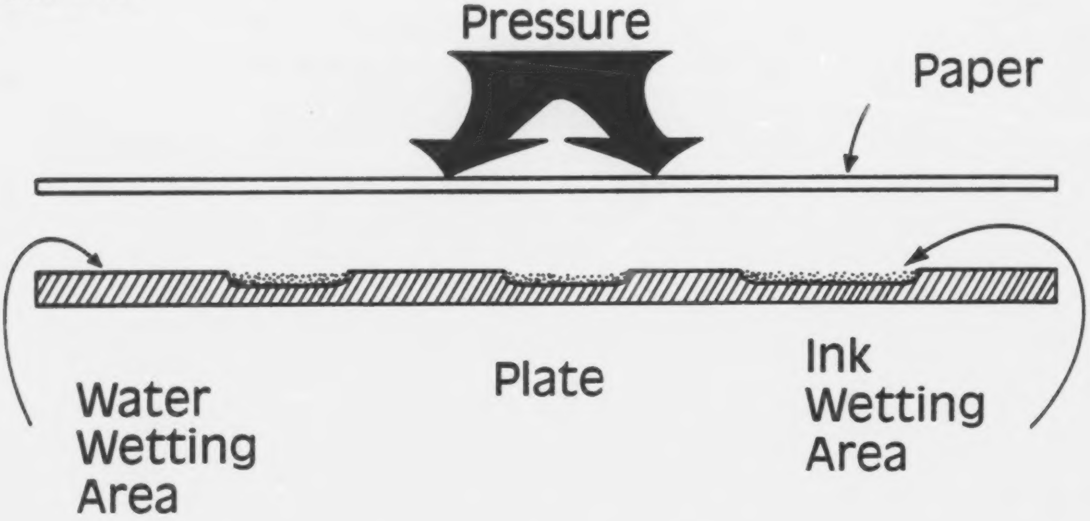


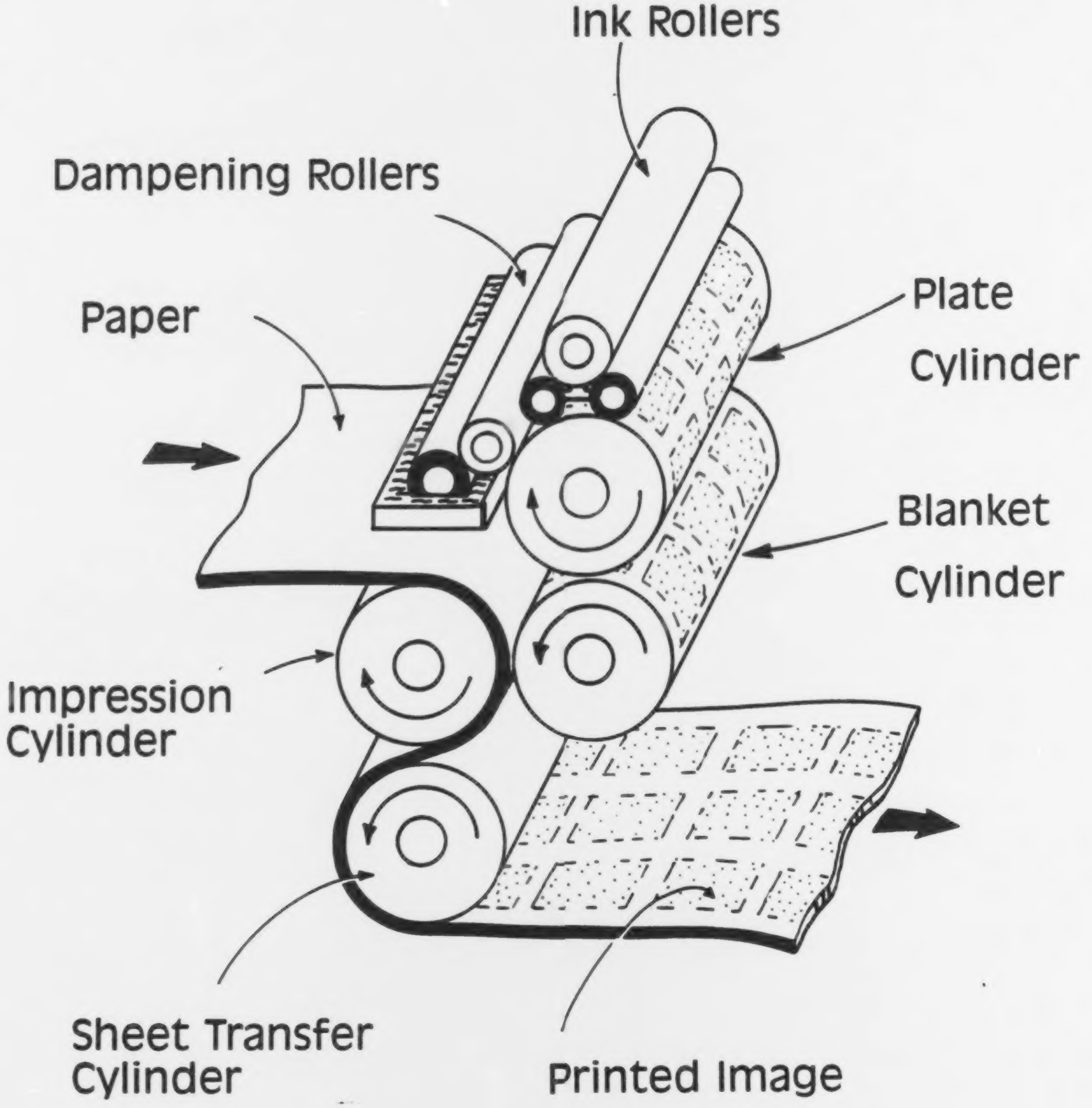
Plate Cylinder
Doctor Blade
Impression Cylinder
Printing Surface
Anilox Roll

Planographic Image Transfer
(Direct)

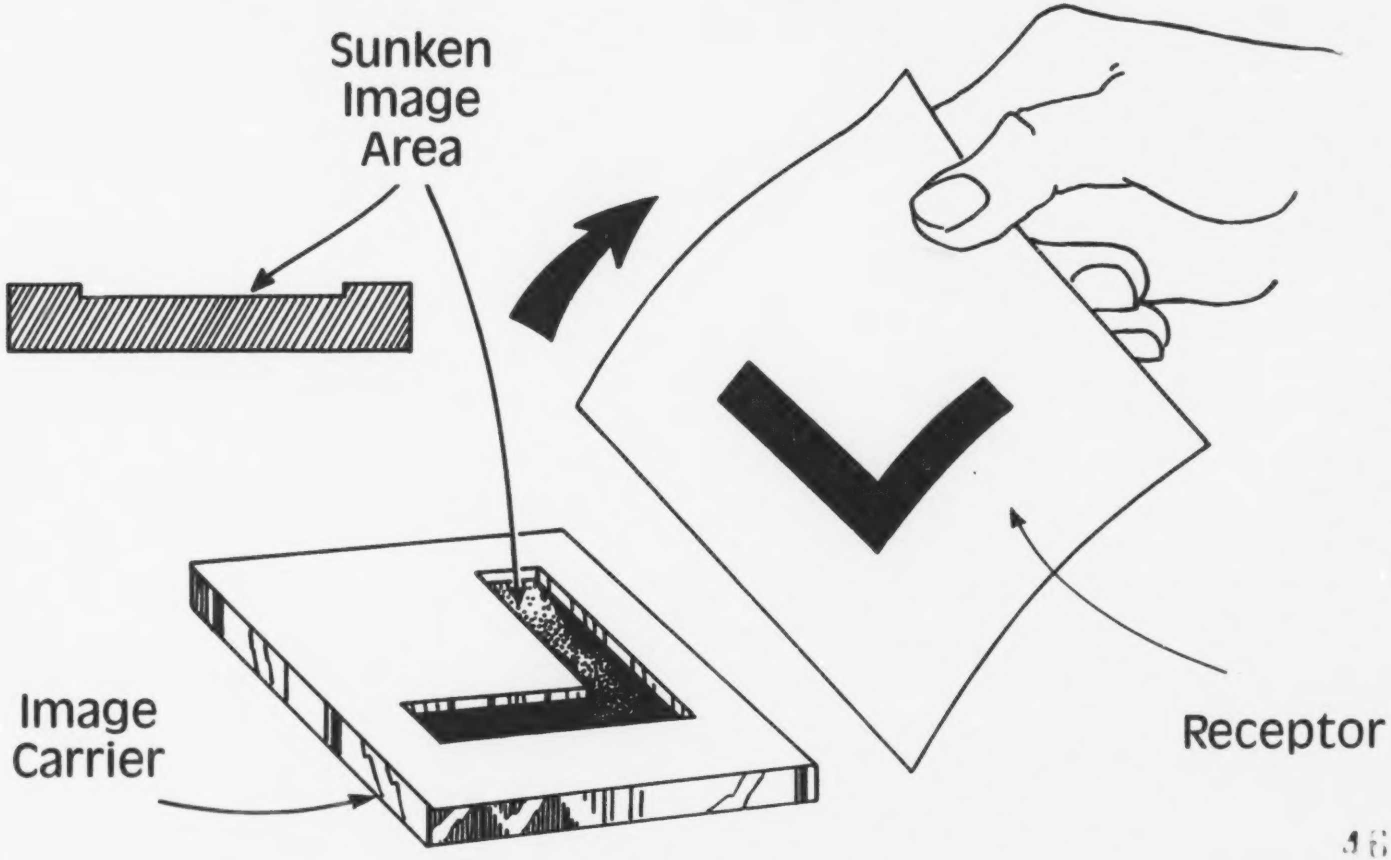

Smooth
Image
Area
Receptor
Image
Carrier


Pressure
Paper
Water
Wetting
Area
Plate
Ink
Wetting
Area

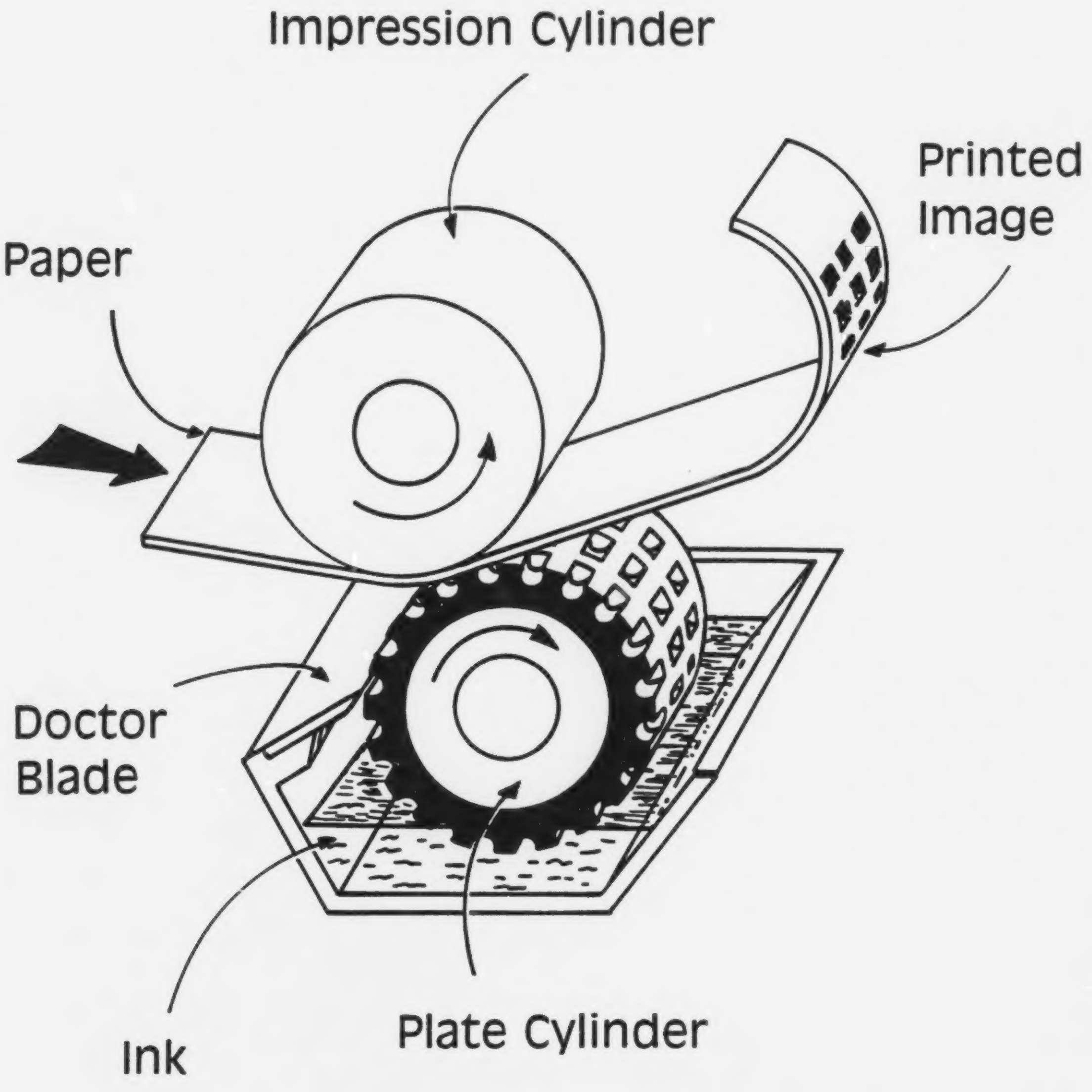
Offset Lithography Image Transfer


Ink Rollers
Dampening Rollers
Paper
Plate Cylinder
Blanket Cylinder
Impression Cylinder
Sheet Transfer Cylinder
Printed Image

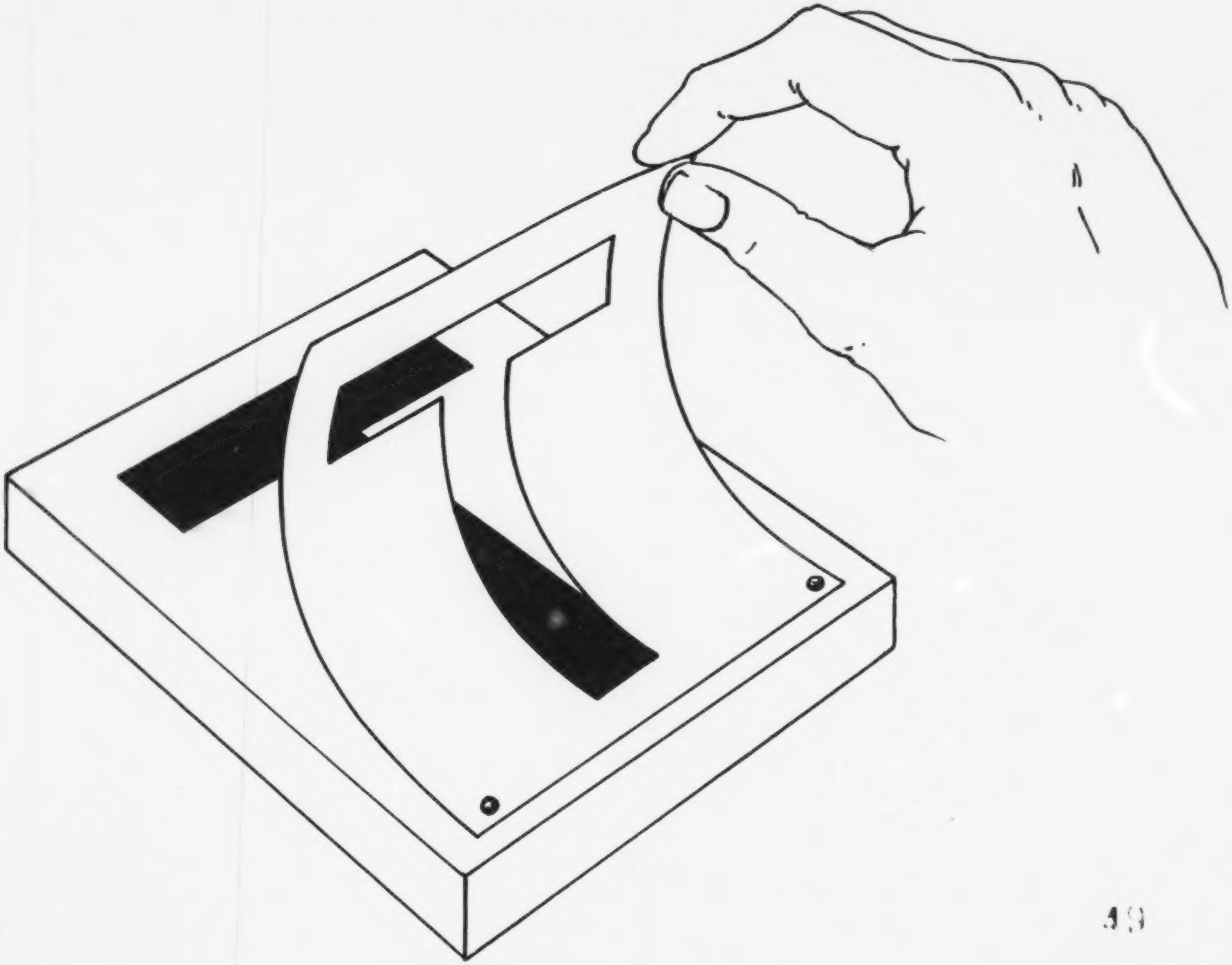
Intaglio Image Transfer


Sunken
Image
Area
Image
Carrier
Receptor

Gravure Image Transfer

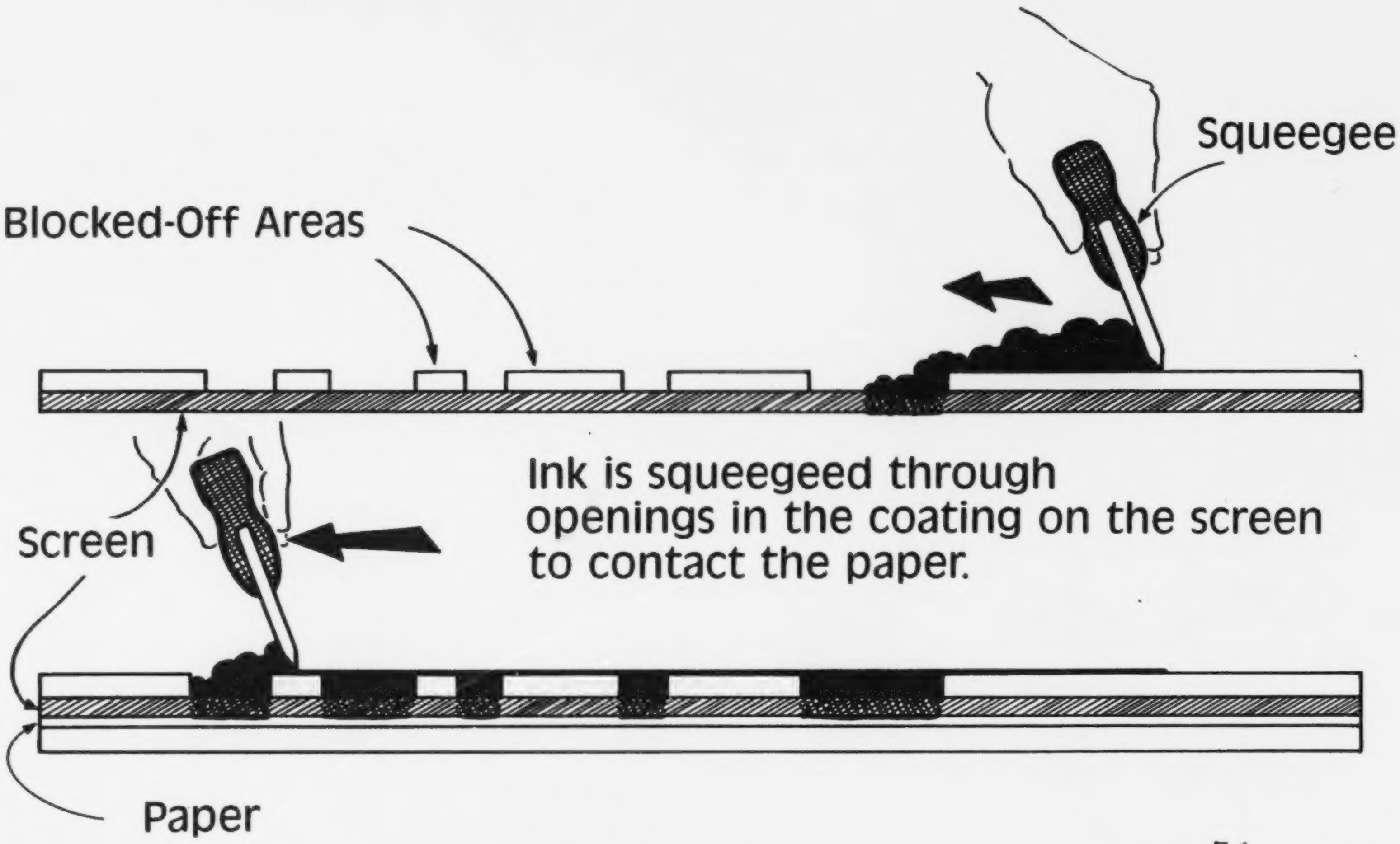

Impression Cylinder
Printed Image
Paper
Doctor Blade
Ink
Plate Cylinder

Stencil Image Transfer



TM 8

Screen Printing Image Transfer


Squeegee
Blocked-Off Areas
Screen
Paper

Ink is squeegeed through openings in the coating on the screen to contact the paper.

HO 1

Printing Methods

Conceptual Transfer Process	Art and Other Processes	Commercial Process
1. Relief	Fingerprints Rubber Stamp Block Printing	Letterpress Flexography
2. Planography	Collotype Direct Lithography Litho Prints or Lithographs	Offset Lithography
3. Intaglio	Dry Point Etching Etching	Gravure • Sheet-fed • Roto-gravure Die Stamping • Copper Plate • Steel Plate
4. Stencil (porous)	Stencils Silk Screen Serigraphy	Screen Printing

ASSIGNMENT SHEET 1 - IMAGE TRANSFER PROCESSES

PART I

Directions: Fill in the blank(s) with the correct word(s) to complete the sentence accurately.

1. The printing process that transfers an image from the raised portion of the image carrier is ______________.
2. ______________ uses a tightly stretched web of fabric or fibers to suspend the image-carrying stencil.
3. Oil and water do not mix. This fact is used as the working principle of the __________ process.
4. ______________ uses the principle that an image can be transferred from a recessed portion of the image carrier.
5. Unusual substrates and heavy ink coverage are features of the ____________ printing process.

PART II

Directions: Using a magnifier, examine samples of products that were printed by each major process. Write the sample number, the name of the process that was used, and the key identifying characteristic on the chart below.

SAMPLE NUMBER	PROCESS	IDENTIFYING CHARACTERISTIC
1.		
2.		
3.		
4.		
5.		
6.		

PART III

Directions: Evaluate printed products you have around home and bring at least one sample that was produced by each of the major printing processes. Show your instructor, using the magnifying glass, how you identified each.

ANSWERS TO ASSIGNMENT SHEET 1 - IMAGE TRANSFER PROCESSES

PART I

1. relief
2. screen printing
3. lithographic
4. intaglio
5. screen printing

PART II

Answers will depend upon the samples selected by the instructor. The table should be completed neatly and accurately to the instructor's satisfaction.

PART III

This section must be evaluated by the instructor on an individual basis for each student. Successful completion of this part should be based on instructor satisfaction with the number and variety of printed items that the student brings to class, as well as correct identification by the student of the printing process employed to produce each sample. The student should be able to identify the source of each and explain how he/she recognized the process by utilizing the information presented in the lesson.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

SCOPE OF UNIT:

This unit includes, by way of introduction, basic knowledge of the printing processes with special emphasis towards offset lithography, its historical past and its technological development. This unit covers production planning, cost estimating, costing, cost accounting, scheduling, production control, purchasing, and inventory as these topics relate to the processing of the job order.

INFORMATION TOPIC: I-2 OR DEMONSTRATION:

JOB PLANNING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. List four types of press imposition.
2. Given a set of job specifications, determine the production steps necessary to produce the job.
3. Given a set of job specifications, determine the best equipment on which to produce the job.
4. Draw an imposition layout and make folding dummies for a saddle stitch booklet.
5. Given a set of job specifications, determine the size and kind of paper to be purchased.
6. Construct a printer's spread ladder for a saddle stitch booklet.
7. Construct a front and back ladder of a saddle stitch booklet.
8. Given a set of job specifications, determine press imposition.
9. Given a set of job specifications, calculate step and repeat coordinates for step and repeat plates.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. TM 1: 8-Page Film Assembly (Stripping) Diagram
2. TM 2: Step and Repeat Layout
3. TM 3: Gang Run Layout
4. TM 4: 8-Page Folding Dummy
5. TM 5: Offset Press; Web Press
6. TM 6: Sheetwise Press Imposition
7. TM 7: Work and Turn Press Imposition
8. TM 8: Work and Flop Press Imposition
9. TM 9: Buckle Folder
10. TM 10: Knife Folder
11. TM 11: Web Press In-Line Folder
12. HO 1: Press Specifications; Sheet-Fed Stock Standard Sizes and Typical Weights
13. HO 2: Film Assembly (Stripping) Layout
14. HO 3: Step and Repeat Layout Sheet; Fraction to Decimal Conversion Table
15. HO 4: The Gang Run
16. HO 5: Instructions for Making Folding Dummies
17. HO 6: Front and Back Ladder; Printer's Spread Ladder
18. HO 7: Sheetwise (Work and Back) Imposition
19. HO 8: Work and Turn Imposition
20. HO 9: Work and Flop Imposition
21. AS 1: Planning Offset Production
22. Video Tape GA-88-110: *Job Orders*. Available from The Media Center, State Fair Community College, 1900 Clarendon Rd., Sedalia, MO 65301 (816)826-7100
23. A selection of printed jobs which students may plan and for which they may write specifications

24. Blank paper for folding dummies, etc.

25. Straight edges for drawing (strips of cardboard are satisfactory)

INFORMATIONAL ASSIGNMENT: (Student)

1. HO 1: Press Specifications; Sheet-Fed Stock Standard Sizes and Typical Weights
2. HO 2: Film Assembly (Stripping) Layout
3. HO 3: Step and Repeat Layout Sheet; Fraction to Decimal Conversion Table
4. HO 4: The Gang Run
5. HO 5: Instructions for Making Folding Dummies
6. HO 6: Front and Back Ladder; Printer's Spread Ladder
7. HO 7: Sheetwise (Work and Back) Imposition
8. HO 8: Work and Turn Imposition
9. HO 9: Work and Flop Imposition

REFERENCES:

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 3, pp. 37-41; ch. 20, sec. 1, pp. 484-494; ch. 21, pp. 514-528.

Latimer, H. C. Advertising Production Planning and Copy Preparation for Offset Printing. 2nd ed. New York, NY: Directors' Book Co., 1969, chs. 10-11.

Saltman, David. Production Planning and Impositions Simplified. Philadelphia, PA: North American Publishing, 1975, chs. 1-8.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles. A. Bennett, 1980, ch. 3, pp. 39-42.

INTRODUCTION:

Production planning is the foundation upon which estimating, costing, and scheduling functions are built. A thorough understanding of the processes, equipment, and sequencing of these steps is necessary before a job can be produced. Job planning is a management function that requires the pragmatism of a craftsman, the discipline of an accountant, and the inquisitiveness of a scientist. The job planner assumes the ultimate responsibility for the success of the job...is it delivered on time?...is it of satisfactory quality?...and does it earn money?

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

OUTLINE: (Key Points)

NOTE: Although this outline is intended as a guide to the instructor, many of the topics listed could be used as a planning specification list. It is suggested that one of the first class activities be to develop a set of production specifications for planning.

I. Customer Specifications

   A. RFQ (request for quote)

      1. Relationship to job ticket or tracer

      2. External constraints to production

   B. Relating customer specifications to cost

II. Printer Specifications - Planning Production

   (NOTE: Press and bindery must be planned before pre-press.)

   A. Planning for press

      1. Press specifications (for each press in plant) (HO 1)

         a. Maximum and minimum sheet size

         b. Maximum image size

         c. Standard and minimum gripper margin

         d. Number of units (1/c, 2/c, 4/c, etc.)

         e. Perfecting

         f. Average I.P.H. (impressions per hour)

      2. Standard paper sizes

         a. Book papers

         b. Business papers

         c. Cover papers

   - d. Index papers
   - e. Others
3. Determining press sheet size
   - a. Planning and drawing film assembler's (stripper's) imposition layout (TM 1, HO 2)
   - b. Bleeds
   - c. Gripper margin
   - d. Quality control device space allotment
4. Multiple impositions (layout)
   - a. Step and repeat (TM 2, HO 3)
     - (1) Making the layout
     - (2) Determining decimal coordinates
   - b. Gang runs (TM 3, HO 4)
   - c. Signature layouts
5. Book - booklet imposition (dummy) (TM 4)
   - a. Folder principles
   - b. Preferred folding
   - c. Labeling the dummy - form designation (HO 5)
   - d. Folios - page numbers
   - e. Gripper and side guide edges
   - f. Supplementary "ladder" system (HO 6)
     - (1) Front and back ladder
     - (2) Printer's spread ladder
     - (3) Sum of facing folios rule
6. Press imposition (TM 5)
   - a. One side - 1/s

b. Sheetwise - S/W (also referred to as work and back) (TM 6, HO 7)

   (1) Features

   (2) Advantages

   (3) Disadvantages

c. Work and turn - W/T (TM 7, HO 8)

   (1) Features

   (2) Advantages

   (3) Disadvantages

d. Work and flop - W/F (also referred to as "work and roll" or "work and tumble") (TM 8, HO 9)

   (1) Features

   (2) Advantages

   (3) Disadvantages

e. The effect of press imposition on:

   (1) Quality

   (2) Length of run

   (3) Ink drying time

   (4) Alternate press selection

f. Press imposition and layout used as collating/gathering tool

7. Buyouts (outside purchases) as they effect press planning

8. Bindery capabilities and methods as a constraint to press planning

9. Projected machine load as a constraint to press planning

B. Planning for bindery and finishing

1. Press imposition and its effect on folding, cutting, and gang processing

2. Folding (TM 9, TM 10, TM 11)
    a. Gate
    b. Parallel
    c. Right angle
    d. Letter
    e. Booklet (signature)
    f. French
3. Parallel vs. right angle for signature production
4. Gathering/collating
5. Gathering/stitching/trimming
6. Cutting - trimming
    a. Programmed
    b. Manual
7. Perfect (hot melt) binding
8. Other finishing operations
    a. Tipping
    b. Padding
    c. Cornering
    d. Stitching/stapling
    e. Embossing, perforating, scoring
    f. Hot stamp
    g. Die cutting

C. Planning prepress operations
    1. Layout and design
        a. Planning and copyfitting
        b. Analyzing the job and customer specifications
        c. Considering customer and external constraints

2. Paste-up

   a. Multiple or single image

   b. Reader's spreads or printer's spreads

   c. Halftone windows, key lines, or stats

   d. Prescreened prints or film halftones

   e. Multicolored overlays or film assembly (stripper) separated color (color break)

3. Camera

   a. Multiple negatives or step and repeat

   b. Ganged halftones or individual shots

   c. Separate negative each color or color break with masks.

   d. Halftones, duotones, special effects, etc.

4. Film assembly (stripping)

   a. Assemble (strip) multiple negatives or mask for step and repeat.

   b. Assemble (strip) negatives each color or mask for color break.

   c. Make positives for positive plates or use multiple burns for negative plates.

   d. Close register film assembly (stripping) or loose register

5. Plates

   a. Positive or negative plates

   b. Additive or subtractive plates

   c. Presensitized or printer-sensitized plates (two sides, one side)

   d. Step and repeat

   e. Multiple burn plate

        f. Prepress proofs
            (1) Type
            (2) Assembled

III. Summary and Conclusion
    A. Customer specifications
    B. Printer specifications - planning production

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

INTERACTION ITEMS:

1. What are customer specifications? What are production specifications? Let's make a list of each.
2. What are the major press impositions?
3. Compare W/T (work and turn) with W/F (work and flop). When you have a choice, which should be used and why?
4. Why must you start planning the job with the press and bindery operations?
5. In what way do press and bindery activities relate and restrict what happens in (a) camera, (b) film assembly and (c) plate departments?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Using samples of printed jobs, plan each step in order to produce the job. Each student should:
    a. Write all the necessary customer specifications.
    b. Draw imposition diagrams with sizes marked.
    c. Determine quantity of stock needed.
    d. Determine number of plates needed.
    e. Determine number of press impressions.
    f. Determine press imposition.
    g. Make folding dummy (if required) marking folios, heads, side guide, and folder headstop edges.

2. Using instructor-supplied specifications, each student should plan a step and repeat job:
   a. Draw a step and repeat layout.
   b. Determine the exposure coordinates in decimals.
3. Using instructor-supplied specifications, each student should plan the production of a booklet:
   a. Make a folding dummy.
   b. Label all folios, folder side guides, folder headstops, heads, and trims.
   c. Make a front/back ladder and a printer's spread ladder and check the folding dummy against these.
   d. Determine the number of plates and impressions needed.
   e. Determine number of press sheets required.
   f. Look at alternative presses and other ways to fold the job.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

EVALUATION ITEMS:

1. List four types of press imposition.

   a.

   b.

   c.

   d.

2. List and describe the production steps and equipment necessary to produce 80,000, 8-1/2 x 11, 2-color flyer printed on 2 sides of 70 lb (b) smooth offset book paper.

3. Make a folding dummy for a 32-page, 6 x 9 saddle stitch booklet. Mark all folios, heads, trims, folder side guide, head stop and form designation. Select a paper suitable for this job.

4. Make a step and repeat layout for 16-up 4 x 5 certificates printed on 17 x 22 bond. Certificates bleed on 4 inch edge. Draw diagram and mark decimal coordinates for each exposure.

5. We are to print 140,000 9 x 11 file dividers on a heavy stock. This job prints on one side only.

   a. Select the press.

   b. Select the stock.

   c. What size stock should we purchase?

   d. Do we need to cut this paper before we run it?

   e. How many impressions will it take to run this job?

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

ANSWERS TO EVALUATION ITEMS:

1. a. One side
   b. Sheetwise (work and back)
   c. Work and turn
   d. Work and flop (mark and tumble, work and roll)

2. Production Steps

   a. Set type
   b. Paste-up
   c. Camera work and processing
   d. Film assembly (stripping)
   e. Plate making
   f. Press (image transfer)
   g. Cutting/trimming

   Equipment

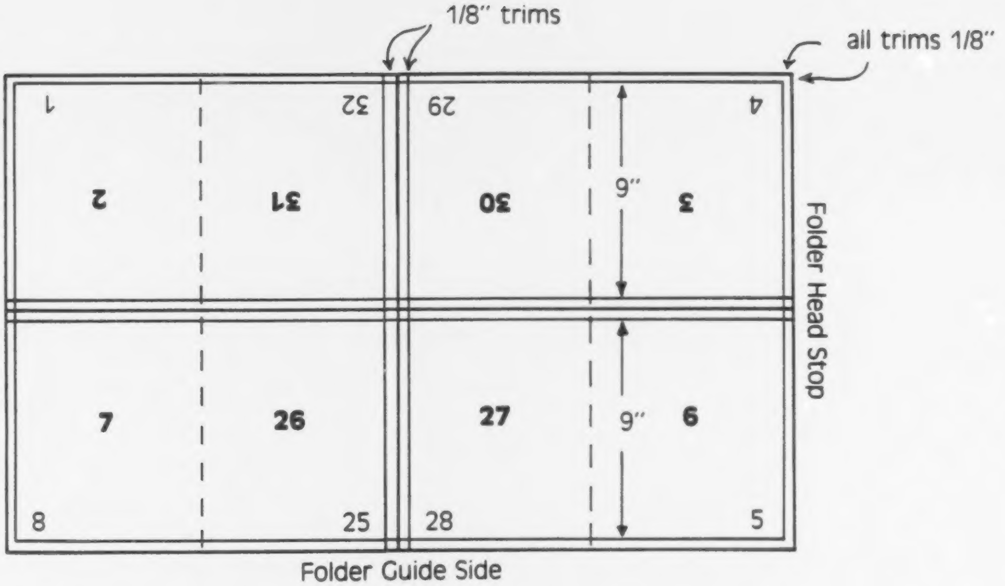
   Specific equipment necessary depends on equipment available in plant and on production methods elected by student.

   Example:

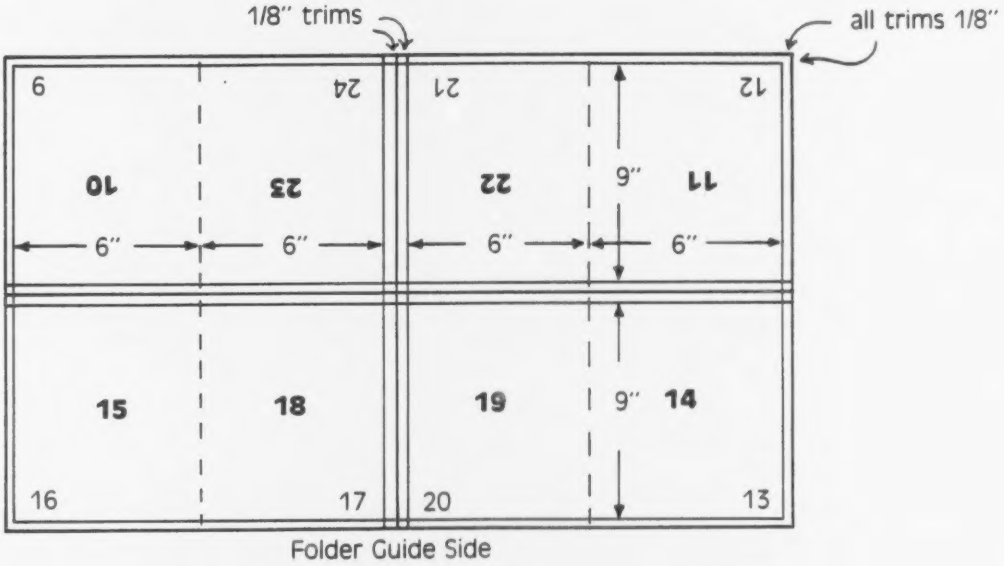
   If this job were to be run 4-up, the production planner may elect to shoot four sets of negatives for sheetwise imposition; shoot two sets for work and turn imposition, make 4-up paste-up step and repeat, etc.

3. The student could elect to make four 8-page signatures, two 16's, or one 32-page signature. This decision would be based on equipment selected and/or available. The following diagrams would represent two 16-page signatures. Any book paper would be suitable for this project.

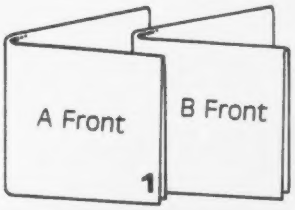
3.


1/8" trims
all trims 1/8"
1
32
29
4
2
31
30
3
9"
Folder Head Stop
7
26
27
9"
6
8
25
28
5
Folder Guide Side

A-Form


1/8" trims
all trims 1/8"
9
24
21
12
10
23
22
9"
11
6"
6"
6"
6"
15
18
19
9"
14
16
17
20
13
Folder Guide Side

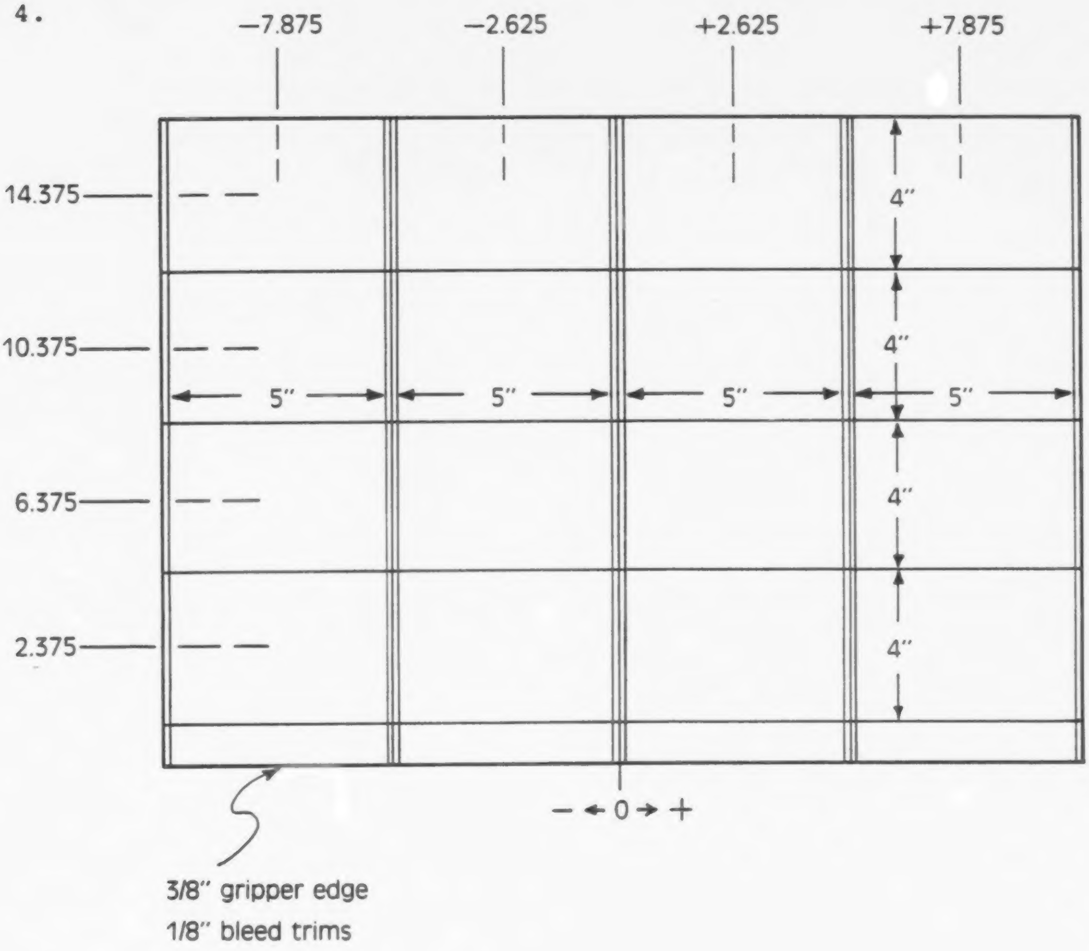
B-Form


A Front
B Front
1

Two 16-page signatures

*Folios in bold font are back of form.
Folios in light font are front of form.

4.


-7.875
-2.625
+2.625
+7.875
14.375
10.375
6.375
2.375
4"
4"
4"
4"
5"
5"
5"
5"
- ← 0 → +
3/8" gripper edge
1/8" bleed trims

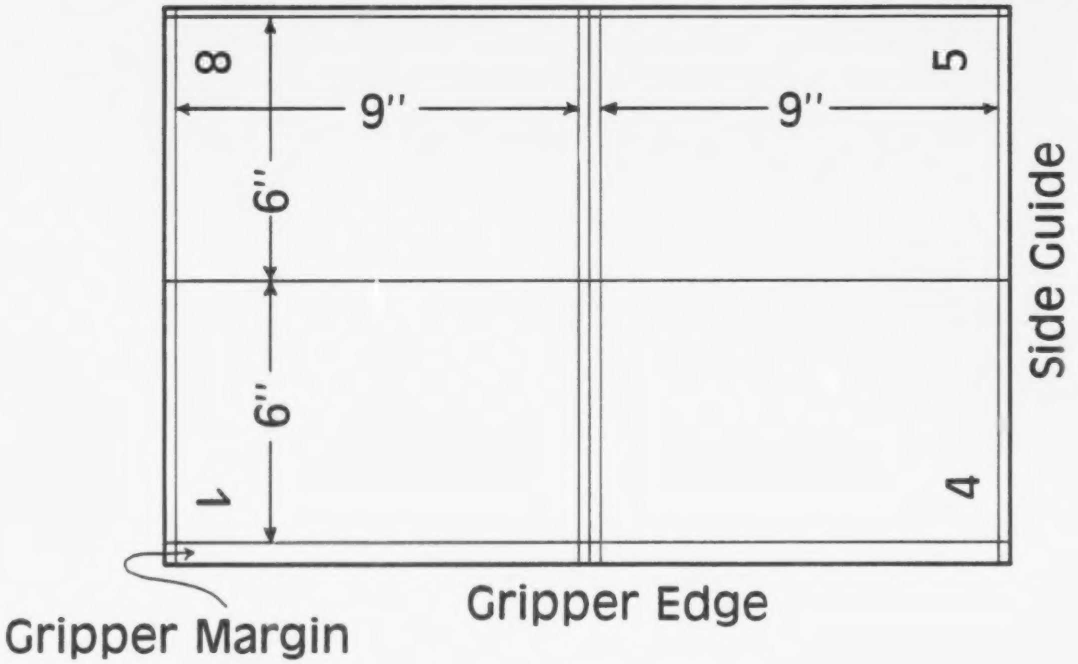
5. The answers the student submits on this problem depend on the equipment and production plan he/she selects. All answers should be consistent with this production plan.

TM 1

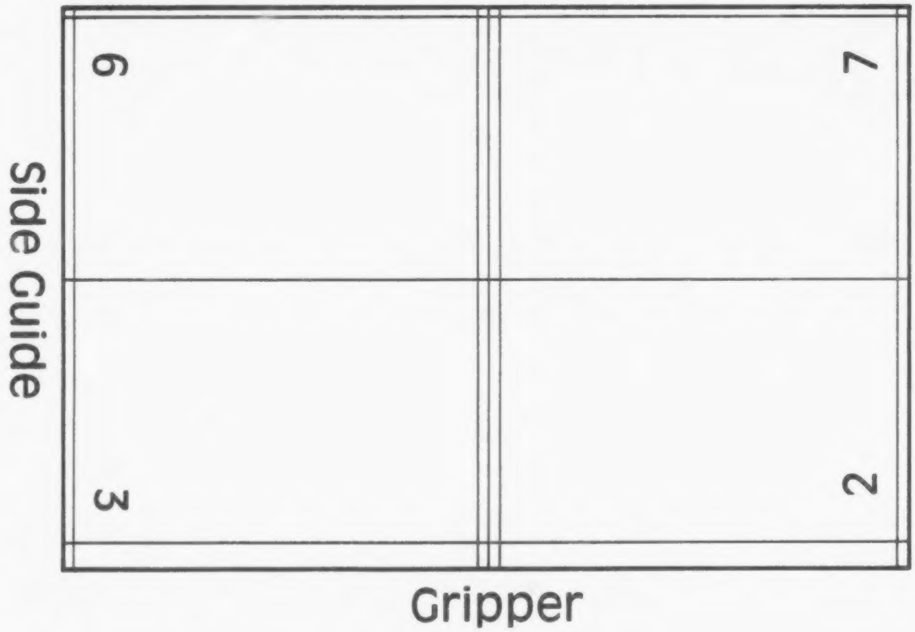
8-Page Film Assembly (Stripping) Diagram

1/8" Trim on top, bottom, and side edges

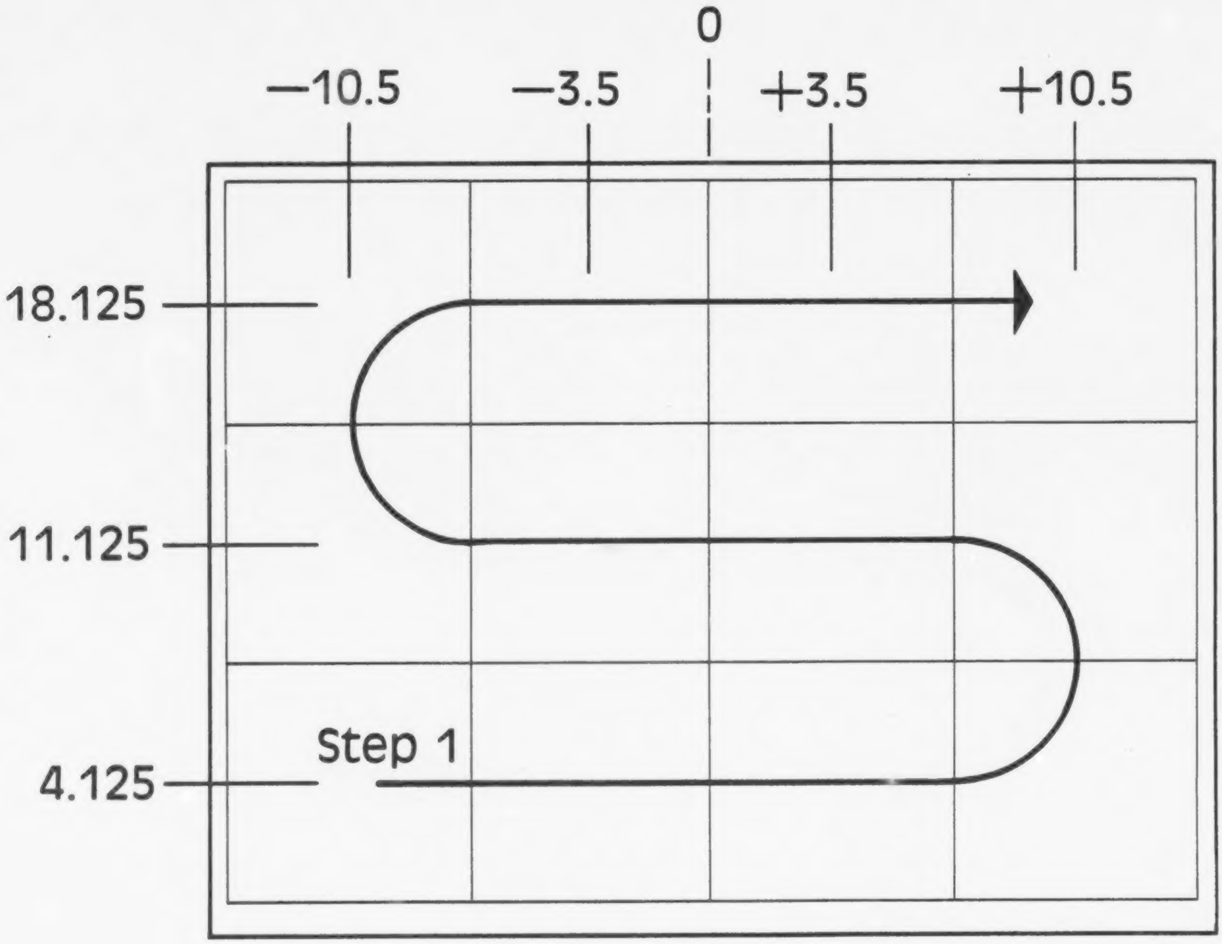
FORM A - Front


8
5
9"
9"
6"
6"
Side Guide
1
4
Gripper Edge
Gripper Margin

FORM A - Back


6
7
Side Guide
3
2
Gripper

Step and Repeat Layout

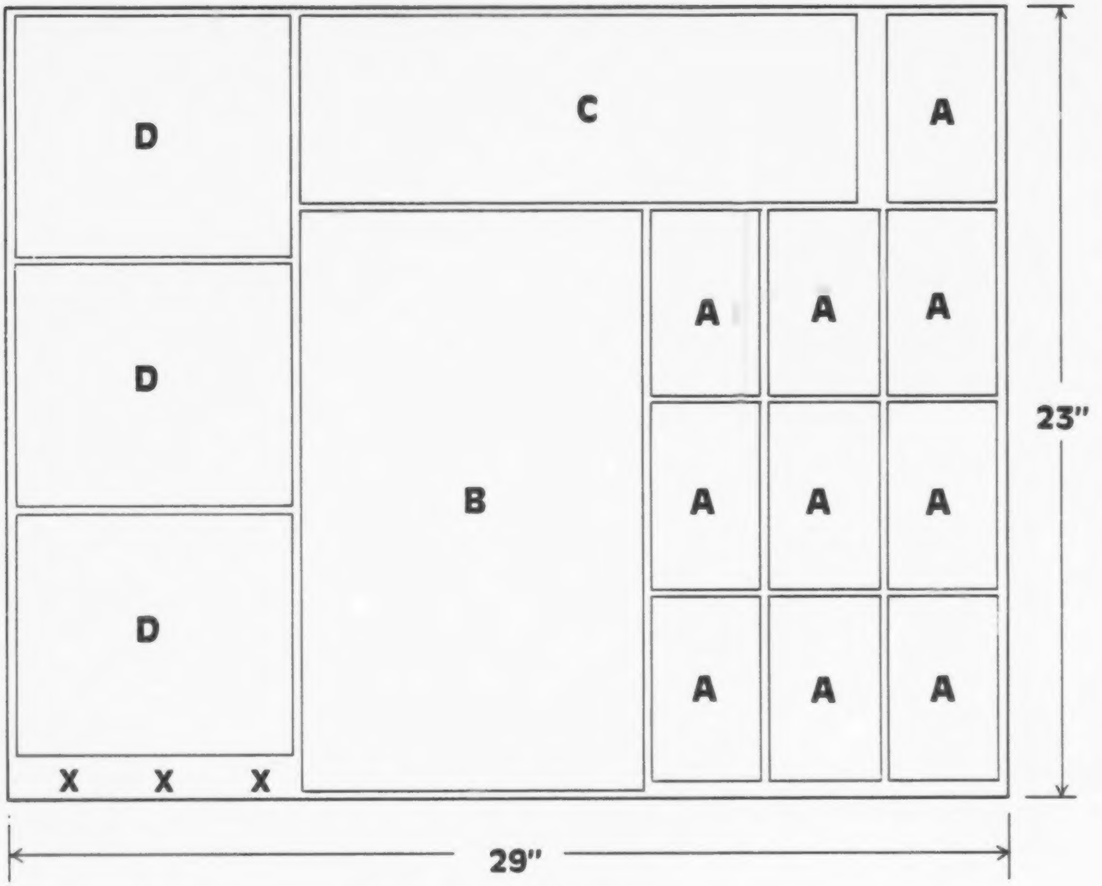

0
—10.5
—3.5
+3.5
+10.5
18.125
11.125
4.125
Step 1

GRIPPER

Step and Repeat 12-Up 7"x 7" instruction cards printed on 23"x 29" press sheet - no bleeds

Gripper margin - 5/8"

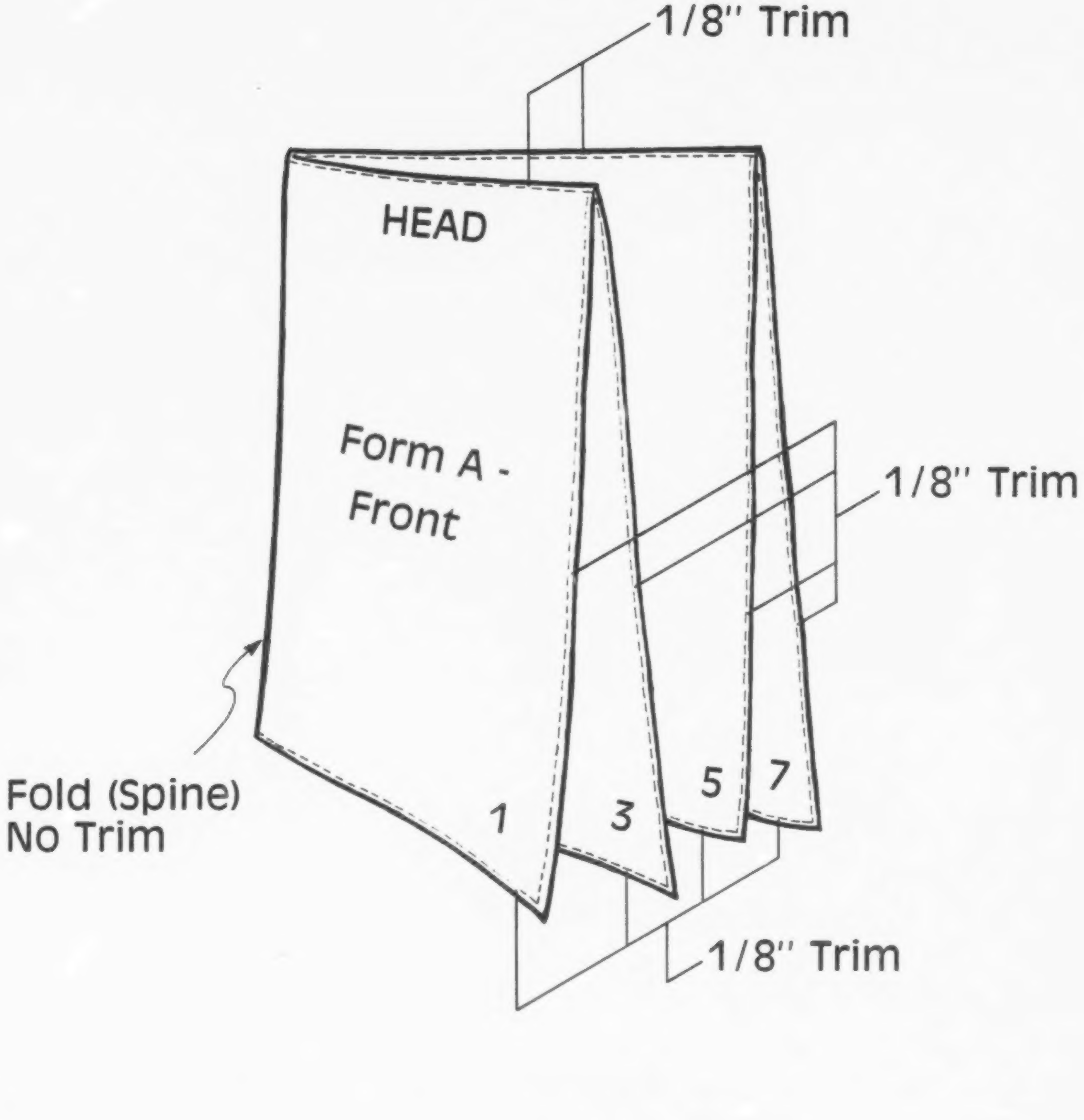
Gang Run Layout


D
C
A
D
A
A
A
B
A
A
A
D
A
A
A
X X X
23"
29"

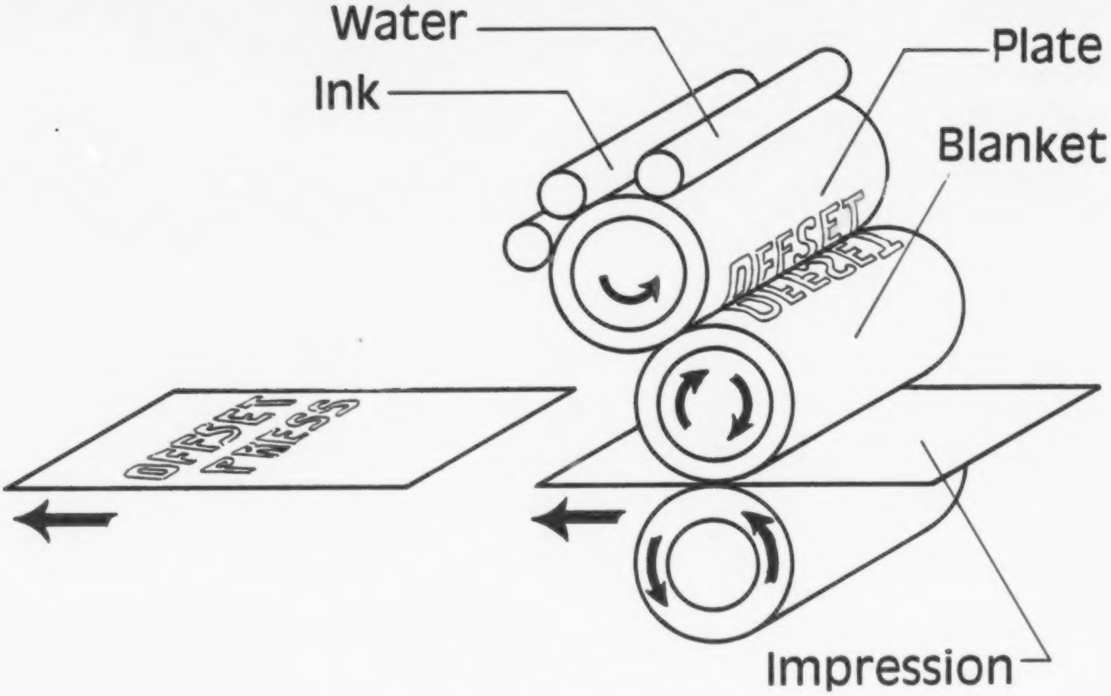
A - 50,000 Postcards - 3¼"x 5½"
B - 5,000 Posters - 10"x 17"
C - 5,000 Window Banners - 16"x 5½"
D - 15,000 Counter Signs - 8"x 7"
X - Waste

Run 5000 sheets 23" X 29"

8-Page Folding Dummy


1/8" Trim
HEAD
Form A - Front
1/8" Trim
Fold (Spine) No Trim
1
3
5
7
1/8" Trim

Offset Press
Sheet Fed Unit


Water
Ink
Plate
Blanket
OFFSET
OFFSET
OFFSET PRESS
Impression

Web Press
Blanket to Blanket

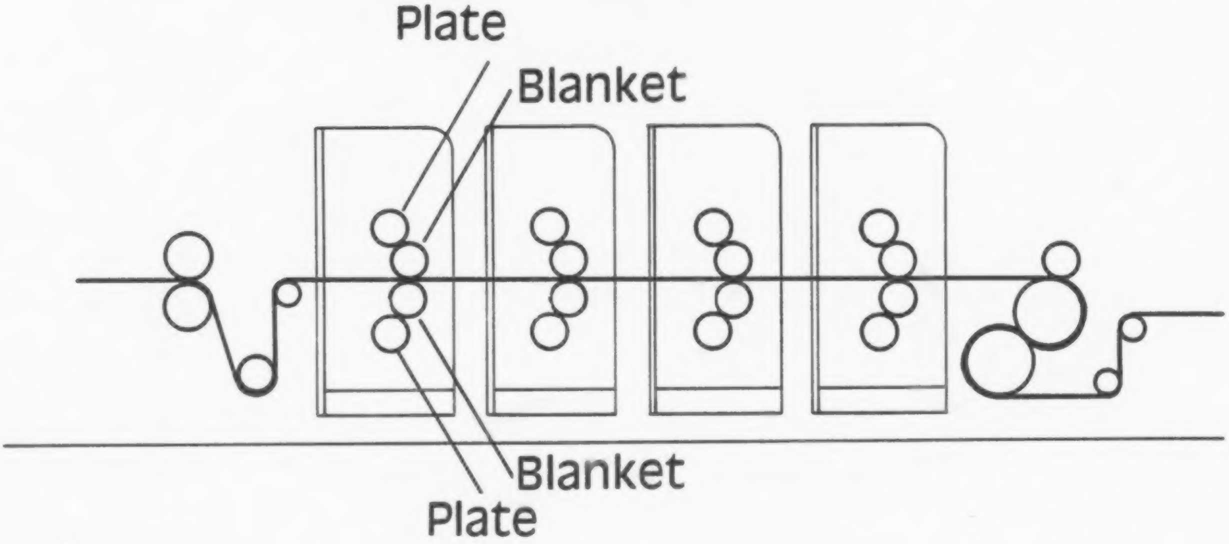
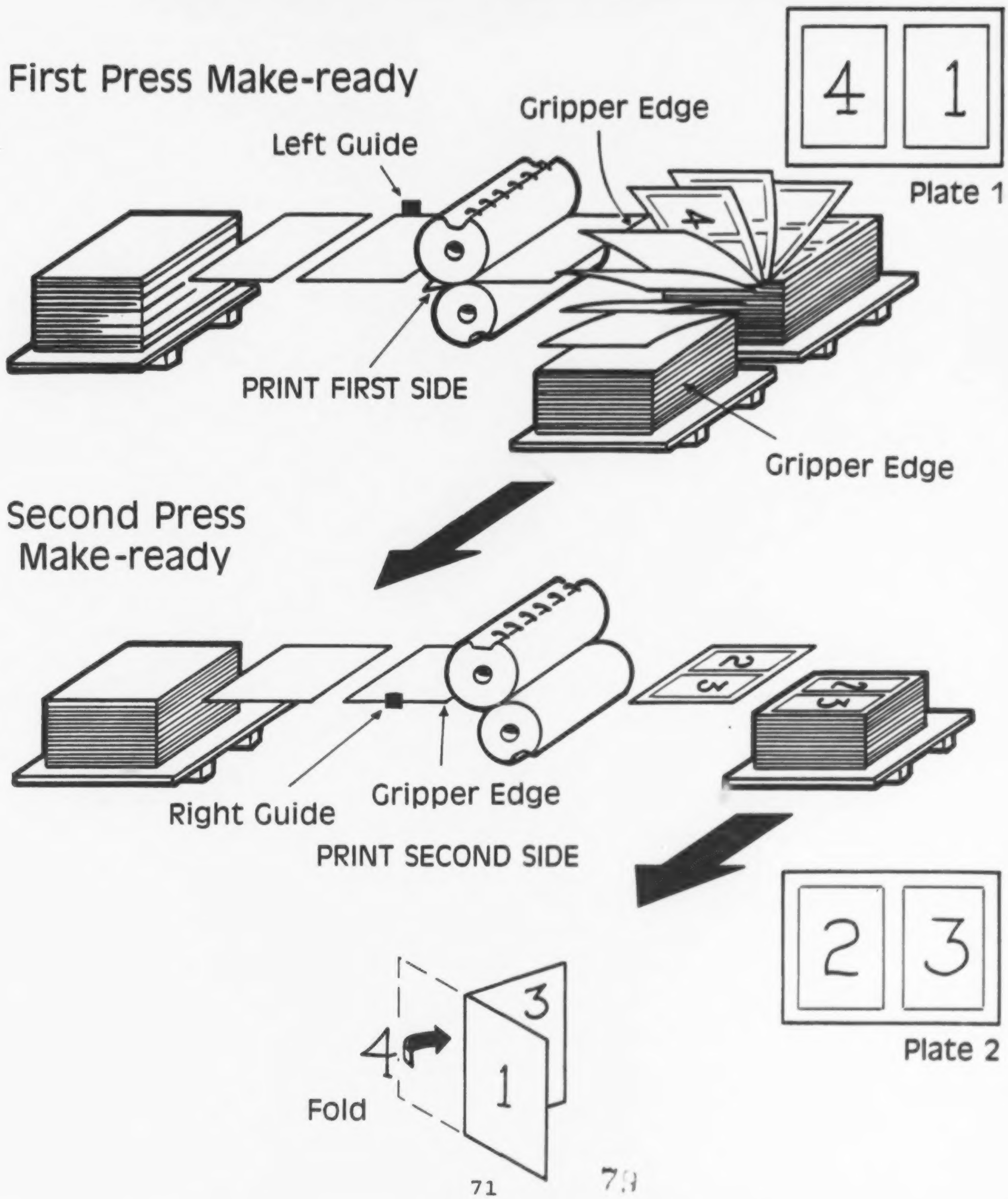


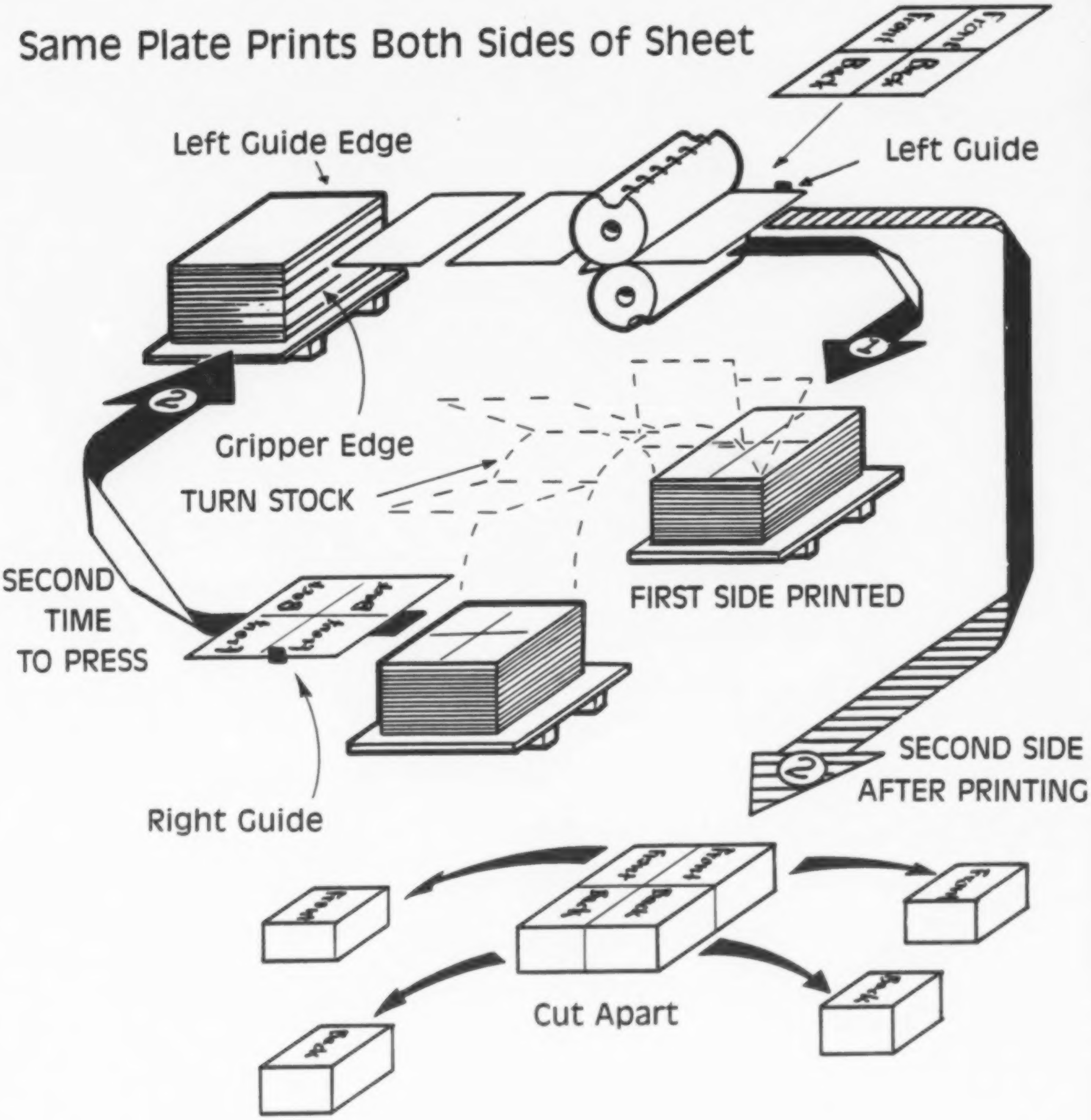
Plate
Blanket
Blanket
Plate

Sheetwise Press Imposition
(Also called work and back)


First Press Make-ready
4
1
Plate 1
Gripper Edge
Left Guide
4
PRINT FIRST SIDE
Gripper Edge
Second Press
Make-ready
2
3
2
3
Right Guide
Gripper Edge
PRINT SECOND SIDE
2
3
Plate 2
3
4
1
Fold

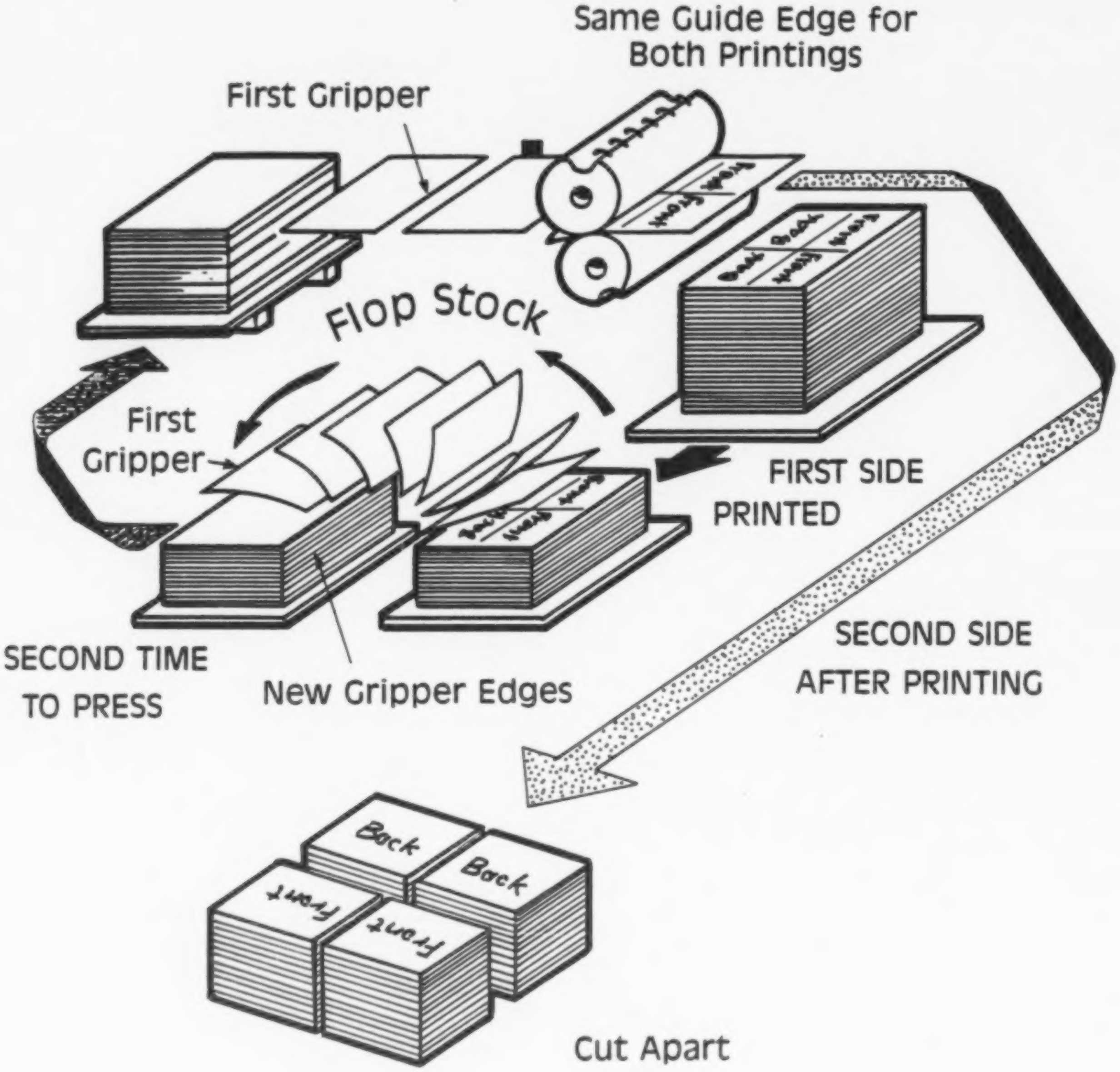
Work and Turn Press Imposition

Same Plate Prints Both Sides of Sheet

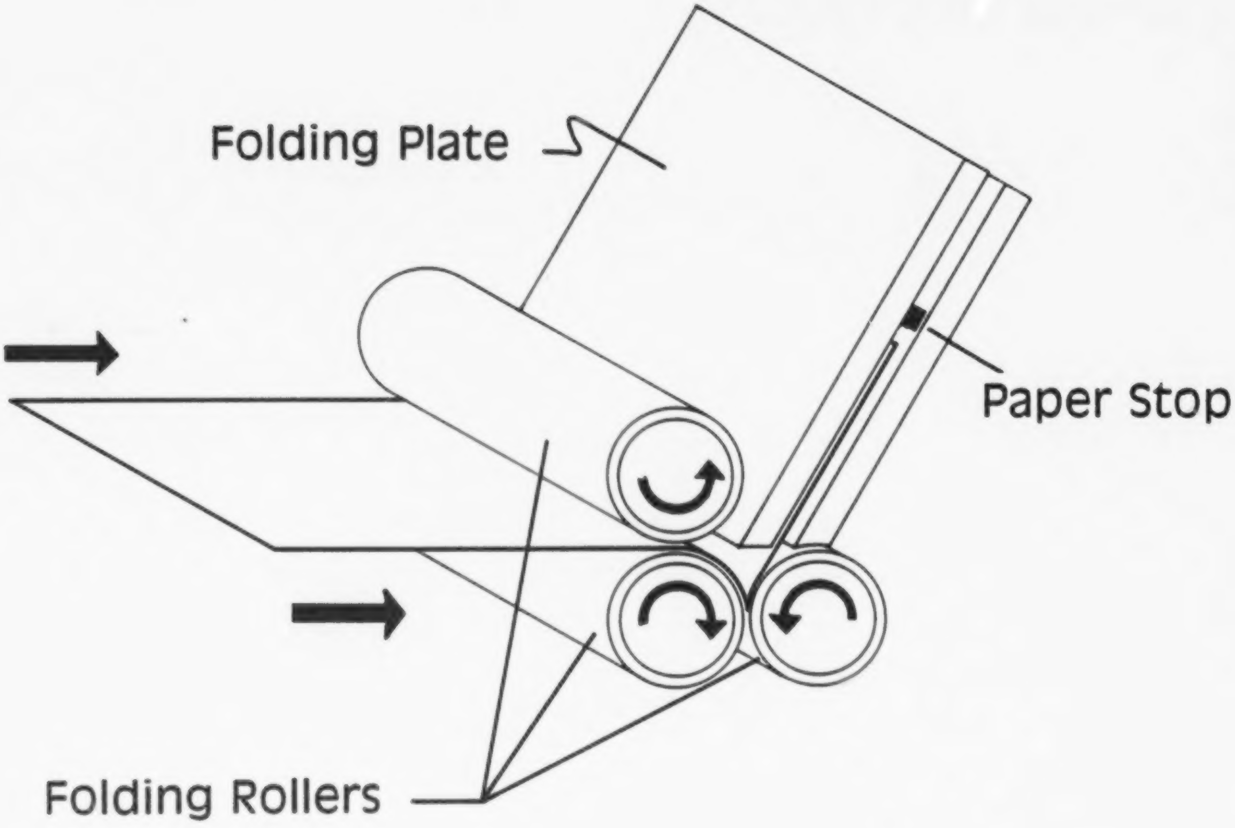

Front
Front
Back
Back
Left Guide Edge
Left Guide
1
2
Gripper Edge
TURN STOCK
SECOND TIME TO PRESS
FIRST SIDE PRINTED
SECOND SIDE AFTER PRINTING
2
Right Guide
Front
Front
Back
Back
Cut Apart
Front
Front
Back
Back

Work and Flop Press Imposition

(Also called work and tumble or work and roll)


Same Guide Edge for Both Printings
First Gripper
Front Front
Back Back
Flop Stock
First Gripper
FIRST SIDE PRINTED
SECOND TIME TO PRESS
New Gripper Edges
SECOND SIDE AFTER PRINTING
Back
Back
Front
Front
Cut Apart

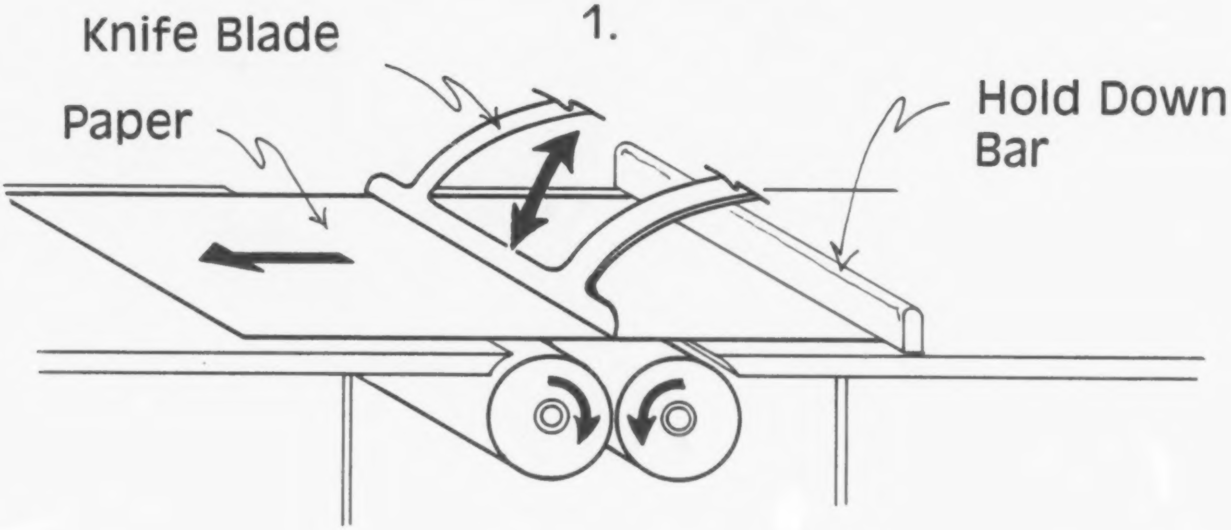
Buckle Folder


Folding Plate
Paper Stop
Folding Rollers

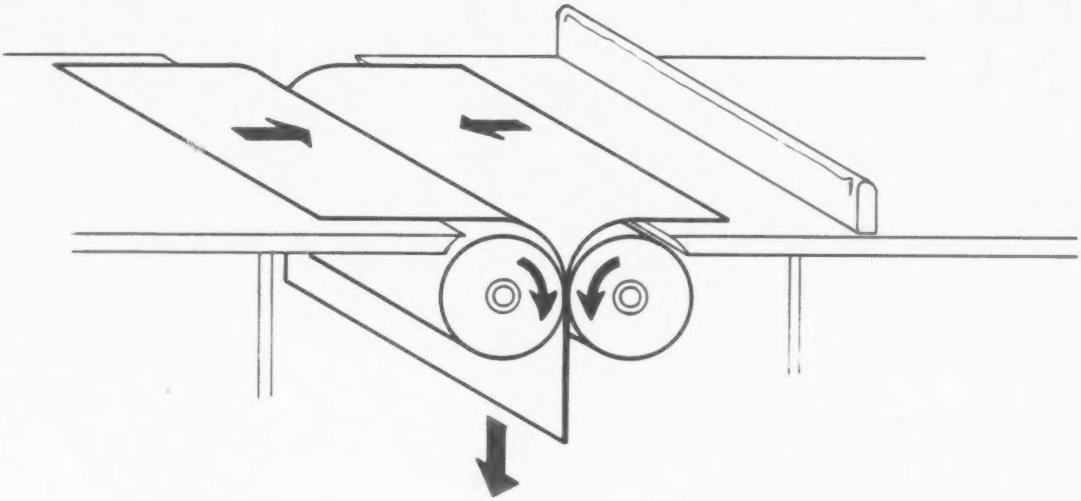
The paper hits the paper stop and buckles downward into the folding machine.

Knife Folder

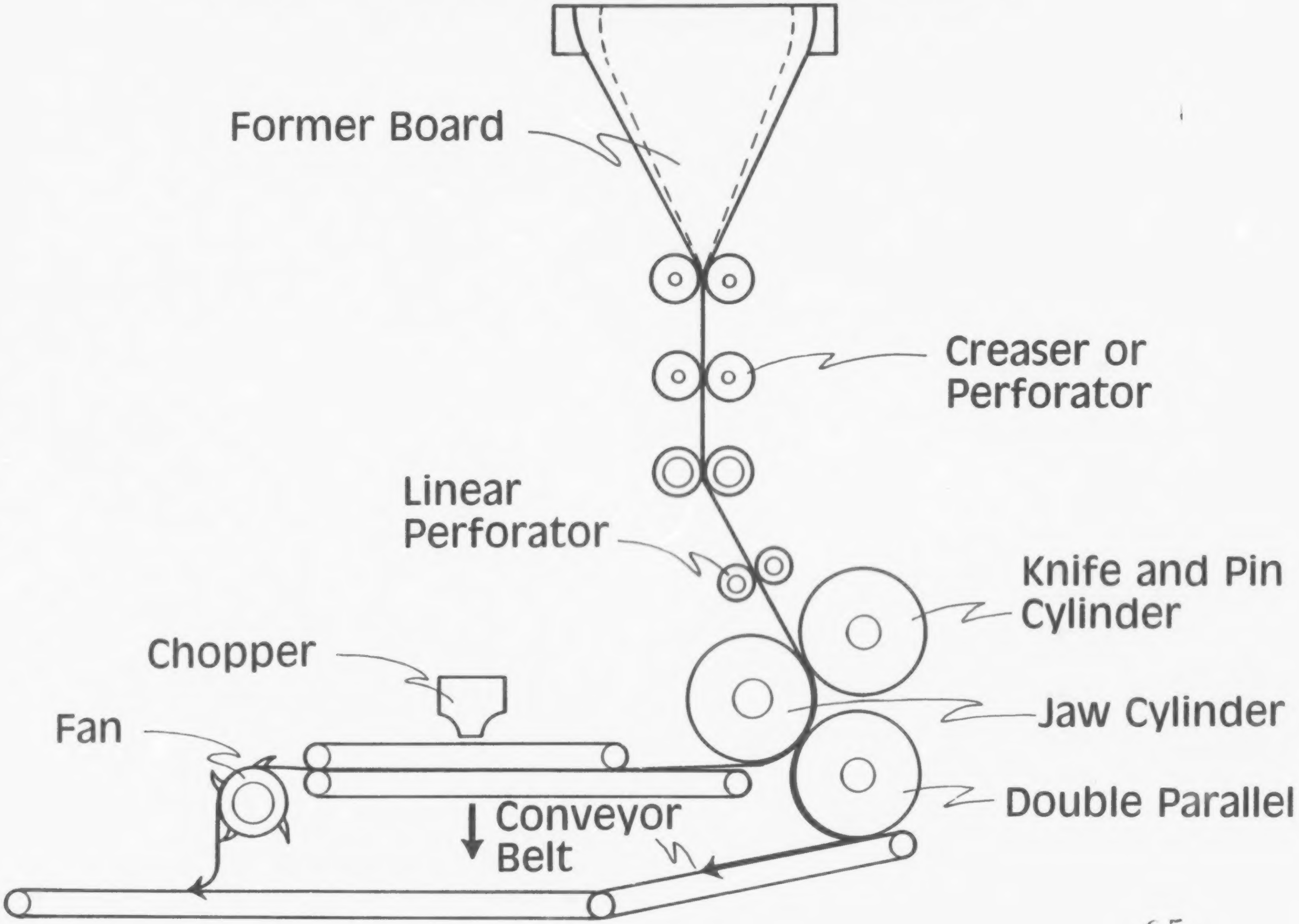
1.


Knife Blade
Paper
Hold Down Bar

2.



Web Press In-Line Folder


Former Board
Creaser or Perforator
Linear Perforator
Knife and Pin Cylinder
Chopper
Jaw Cylinder
Fan
Double Parallel
Conveyor Belt

HO 1

Press Specifications; Sheet-Fed Stock Standard Sizes and Typical Weights

Press Description	Maximum Sheet Size	Minimum Sheet Size	Maximum Image Size	Optimum Gripper	Minimum Gripper
10 x 15 Davidson 1-color	10 x 15	3 x 7	9 1/2 x 13	3/8"	1/4"
17 x 22 R & P 1-color	17 1/4 x 22 1/4	8 1/2 x 11	16 5/8 x 22	3/8"	5/16"
19 x 25 Royal Zenith 1-color	19 1/2 x 25 1/4	10 1/2 x 16 1/2	18 3/8 x 24 3/4	1/2"	3/8"
19 x 25 Solna 2-color	19 1/2 x 25	11 x 17	18 3/8 x 24 1/4	1/2"	3/8"
23 x 29 Miehle 1-color	23 x 31	14 x 22	22 1/2 x 29 1/2	5/8"	7/16"
25 x 38 Miller 2-color	25 x 38	18 x24	24 1/2 x 38	3/4"	1/2"
25 x 38 Miehle 4-color	25 x 38	18 x 24	24 1/2 x 38	3/4"	1/2"

Add specifications for other presses that you are familiar with in the blank spaces.

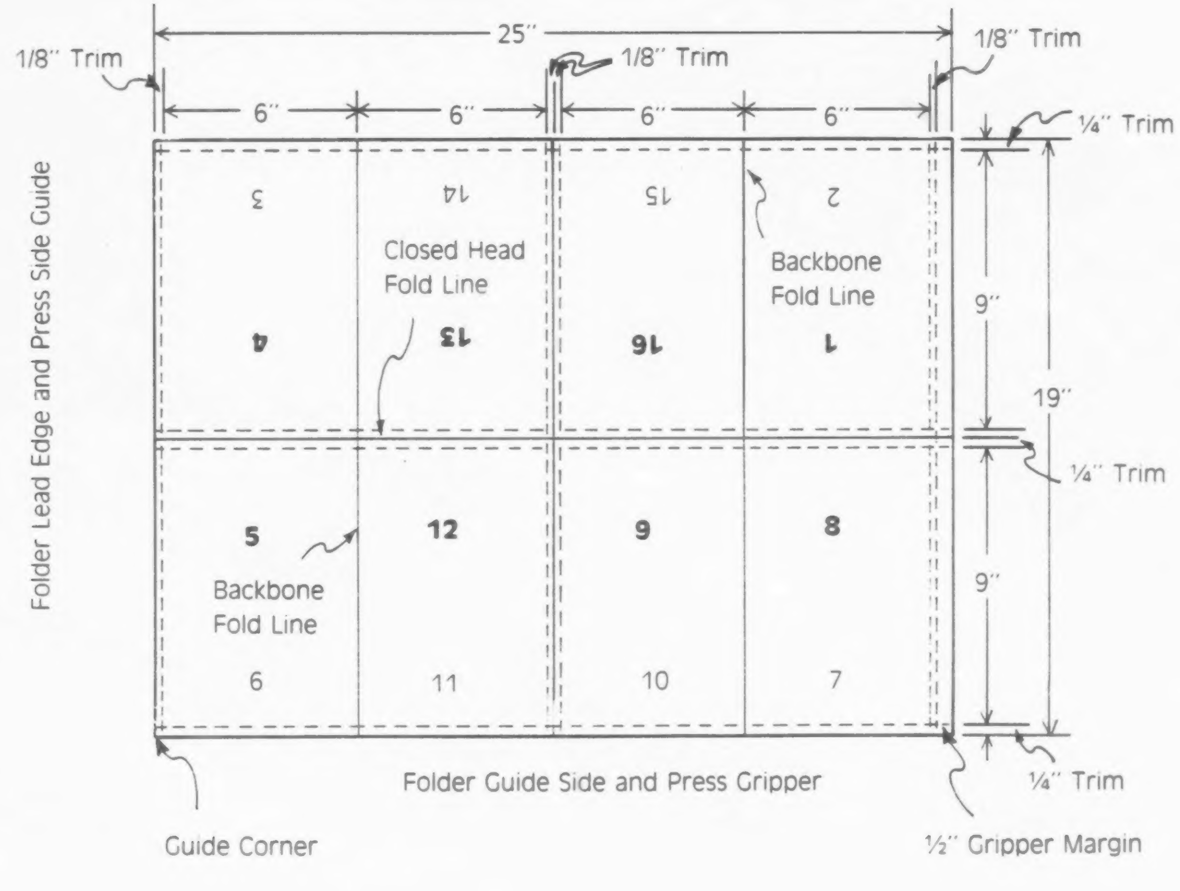
Sheet-Fed Stock: Standard Sizes and Typical Weights

Paper Grade	Standard Sizes			Typical Basic Weights
Book Papers (Basis 25 x 38)	17½ x 22½ 23 x 35 38 x 50	19 x 25 25 x 38	23 x 29 25 x 45	50, 60, 70, 80, 100
Cover Papers (Basis 20 x 25)	23 x 29 20 x 26	23 x 35	26 x 40	60, 65, 80, 100
Index (Basis 25½ x 30½)	20½ x 24¾ 24 x 36	22½ x 28½ 25½ x 30½	22½ x 35	90, 110, 140
Bristol (Basis 22½ x 28½)	23 x 29 35 x 46	23 x 35 22½ x 28½	26 x 40	57, 67, 100, 120
Bond/Business (Basis 17 x 22)	17 x 28 22 x 34 17 x 22	19 x 24 24 x 38	20 x 28 28 x 34	Bond 9, 13, 16, 20, 24 Ledger 24, 28, 32, 36
Cut Papers	Most bonds and index availabile in 8½ x 11 and 11 x 14.			

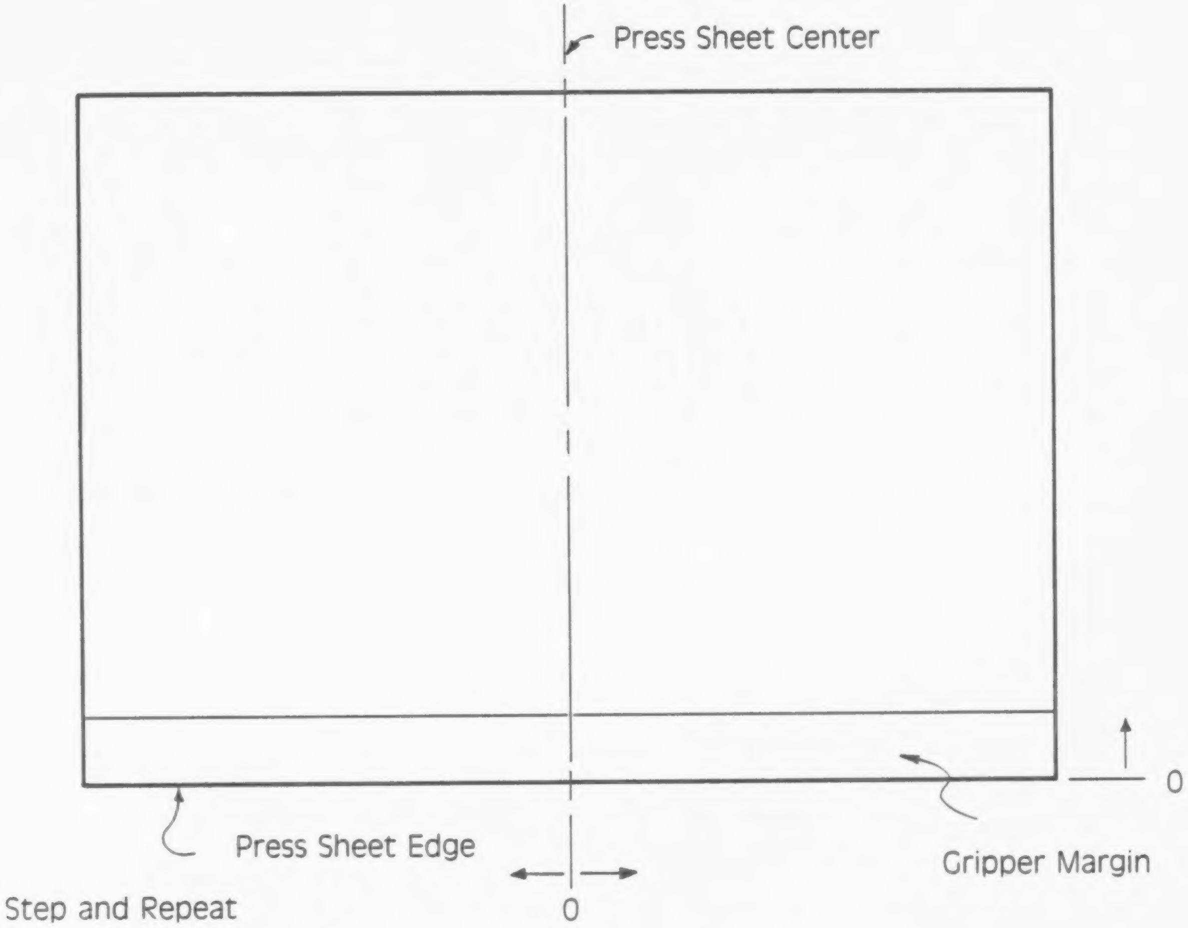
Film Assembly (Stripping) Layout

All details determined in making the folding dummy and the ladders should be transferred to a stripper's imposition layout. This will become the film assembly blueprint.

- BOLD NUMBER IS FRONT SIDE PAGE NUMBER.
- LIGHT NUMBER IS BACK SIDE PAGE NUMBER.
- SOLID LINE IS FOLD LINE.
- DASH LINE IS TRIM LINE.
- ALL BINDERY RETRIMS ARE 1/8."


25"
1/8" Trim
1/8" Trim
1/8" Trim
6"
6"
6"
6"
¼" Trim
3
14
15
2
Closed Head Fold Line
Backbone Fold Line
4
13
16
1
9"
19"
¼" Trim
5
12
9
8
Backbone Fold Line
9"
6
11
10
7
¼" Trim
Folder Lead Edge and Press Side Guide
Folder Guide Side and Press Gripper
Guide Corner
½" Gripper Margin

Step and Repeat Layout Sheet; Fraction to Decimal Conversion Table



	DECIMAL	mm
1/64	.0156	0.396
1/32	.0312	0.793
3/64	.0468	1.190
1/16	.0625	1.587
5/64	.0781	1.984
3/32	.0937	2.381
7/64	.1093	2.778
1/8	.125	3.175
9/64	.1406	3.571
5/32	.1562	3.968
11/64	.1718	4.365
3/16	.1875	4.762
13/64	.2031	5.159
7/32	.2187	5.556
15/64	.2343	5.953
1/4	.250	6.350
17/64	.2656	6.746
9/32	.2812	7.143
19/64	.2968	7.540
5/16	.3125	7.937
21/64	.3281	8.334
11/32	.3437	8.731
23/64	.3593	9.128
3/8	.375	9.525
25/64	.3906	9.921
13/32	.4062	10.318
27/64	.4218	10.715
7/16	.4375	11.112
29/64	.4531	11.509
15/32	.4687	11.906
31/64	.4843	12.303
1/2	.500	12.700
33/64	.5156	13.096
17/32	.5312	13.493
35/64	.5468	13.890
9/16	.5625	14.287
37/64	.5781	14.684
19/32	.5937	15.081
39/64	.6093	15.478
5/8	.625	15.875
41/64	.6406	16.271
21/32	.6562	16.668
43/64	.6718	17.065
11/16	.6875	17.462
45/64	.7031	17.859
23/32	.7187	18.256
47/64	.7343	18.653
3/4	.750	19.050
49/64	.7656	19.446
25/32	.7812	19.843
51/64	.7968	20.240
13/16	.8125	20.637
53/64	.8281	21.034
27/32	.8437	21.431
55/64	.8593	21.828
7/8	.875	22.225
57/64	.8906	22.621
29/32	.9062	23.018
59/64	.9218	23.415
15/16	.9375	23.812
61/64	.9531	24.209
31/32	.9687	24.606
63/64	.9843	25.003
1	1.000	25.400

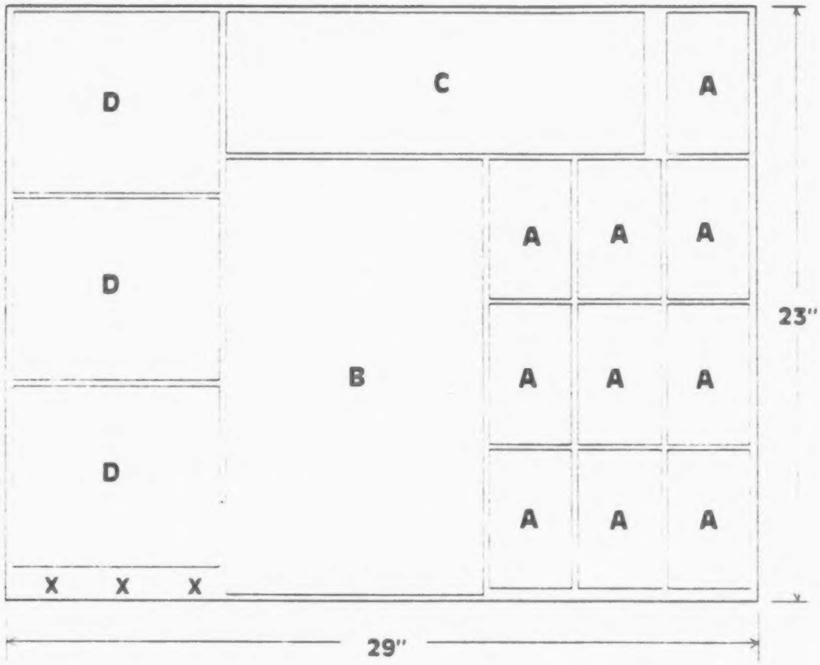
The Gang Run

The gang run is a labor saving production plan used when several jobs require the same type of paper stock. It saves plates and press make-ready time.

The gang run requires run quantities of each of the components to be compatible; i.e., some should be multiples of the others. The example shown worked out exactly right, although it is quite common to run more of one item than necessary in order to produce required quantities of other items. The decision to run extras depends upon the cost of extra stock vs. the cost savings in press and plate time.

The example is an in-store point of purchase campaign for a single customer. Jobs from different customers may also be ganged for a single press run.

Gang Run Layout



A - 50,000 Postcards - 3¼"x 5½"
B - 5,000 Posters - 10"x 17"
C - 5,000 Window Banners - 16"x 5½"
D - 15,000 Counter Signs - 8"x 7"
X - Waste

Run 5,000 sheets 23"x 29"

Instructions for Making Folding Dummies

Materials: Plain paper in proportional size to press sheet
Specifications: Finished size and number of pages

1. Determine the number of pages each signature (folding dummy) will be.
2. Select (or cut) a blank sheet of paper that is proportional to the size of the folding dummy.
3. Lay the sheet out in a vertical position. Mark "S.G." on the edge of the sheet and "Headstop" on the top edge. (Figure A)
4. Turn this sheet over and place similar markings on the **same** edges of the back. (Figure B)
5. Return sheet to its original position. The "S.G." represents the side guide of the folder and the "Headstop" is the edge of the sheet that will hit the sheet stop in the first folding plate.
6. Fold the sheet back onto itself so that the headstop edge and the bottom edge align. (Figure C)
7. This folded piece will come out of the folder in this position, folded edge first. If there is to be only one fold, the job is complete at this point and is a 4-page dummy (Figure C) with page 4 on top.
8. If a second fold (right angle) is to be made, the folded edge (first fold) will become the side guide and the side guide edge (left) will be the headstop for the second fold.
9. Fold the sheet in half again from left to right (Figure D). This piece represents 8 pages. Page 1 of the folding dummy should be on top, right side up.

Figure A

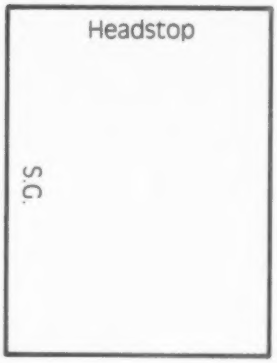


Figure B

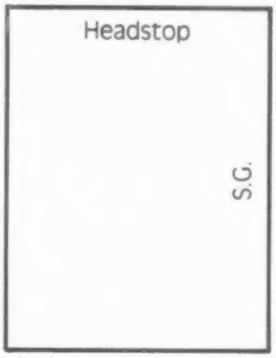


Figure C

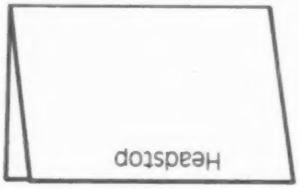
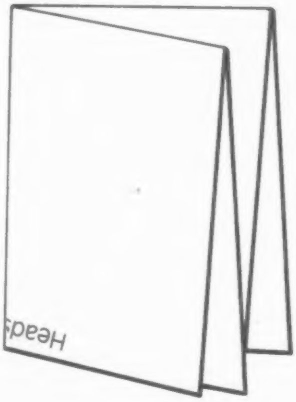
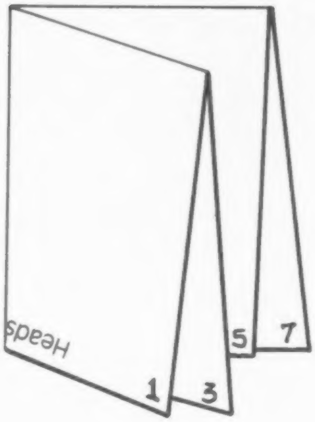


Figure D



10. Number each page consecutively in the lower right-hand corner. (Figure E)

Figure E



11. Construct an 8-page front and back ladder and an 8-page printer's spread ladder to check your folding dummy. (See HO 7)

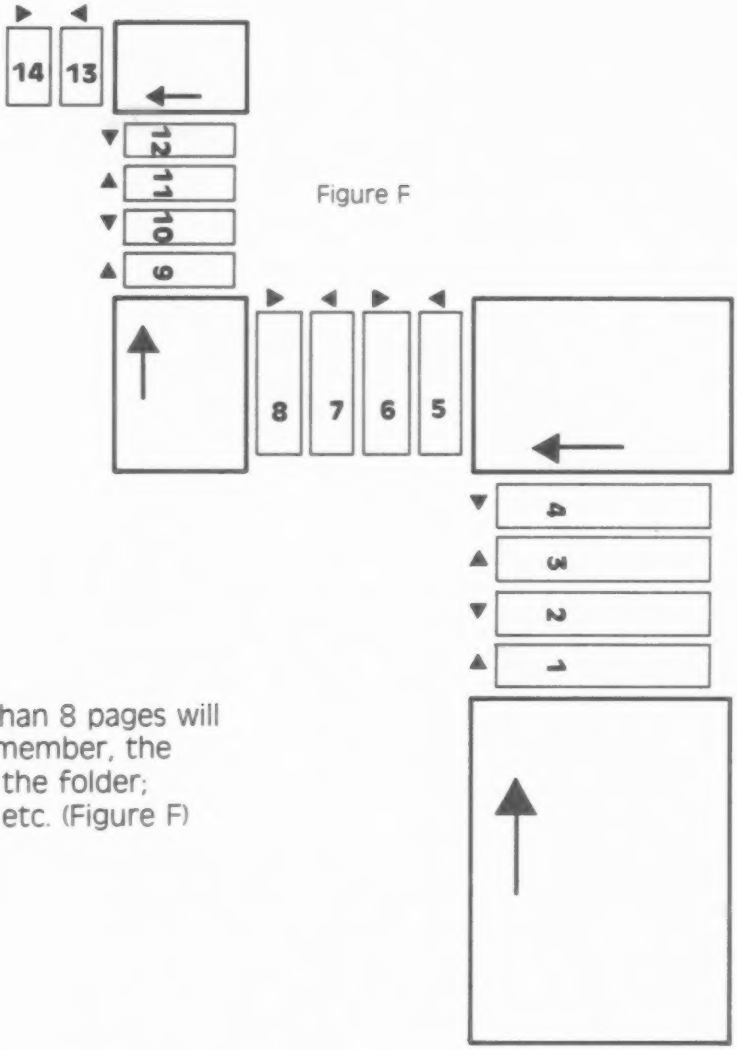
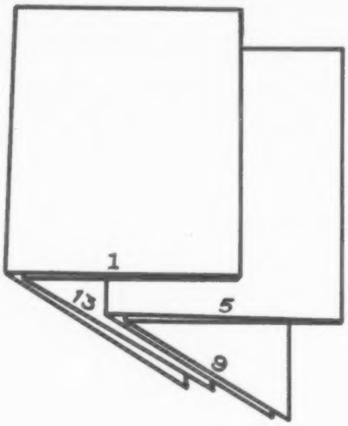


Figure F

12. Folding dummies of more than 8 pages will be made the same way. Remember, the paper always goes through the folder; forward, left, forward, left, etc. (Figure F)

13. If a book or booklet is to be "built" of more than one signature, signatures are inserted inside each other **before** the pages are numbered. This will provide a folding dummy for a saddle stitched booklet. (Figure G)

Figure G



14. Perfect bound or case bound books are built of signatures **stacked**, one on top of the other. Each signature may be numbered before being assembled. (Figure H)

15. Figure I shows a folding dummy for a 16-page signature and the page imposition that results from it. Figure J shows the front and back ladder for a 16-page signature. Figure K shows a printer's spread ladder for a 16-page signature.

Figure H

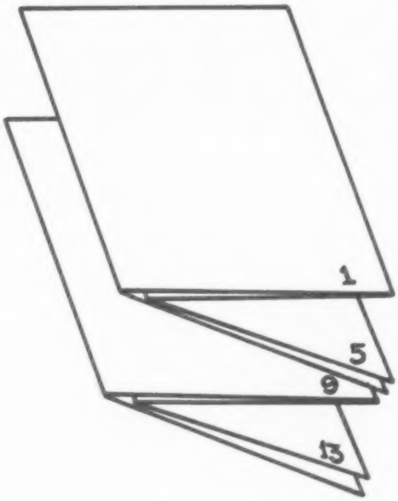
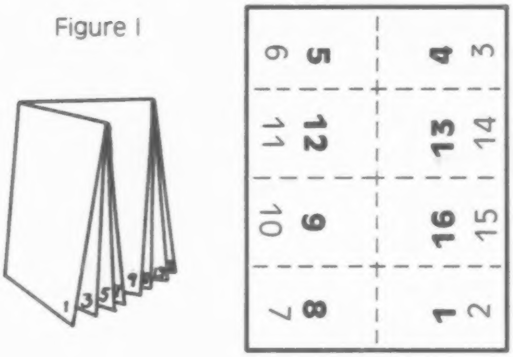


Figure I



Bold numbers represent the folios (printed page numbers) appearing on the front of the imposition layout.

Figure J

Back	Front
2	1
3	4
6	5
7	8
10	9
11	12
14	13
15	16

16-Page Front and Back Ladder

Figure K

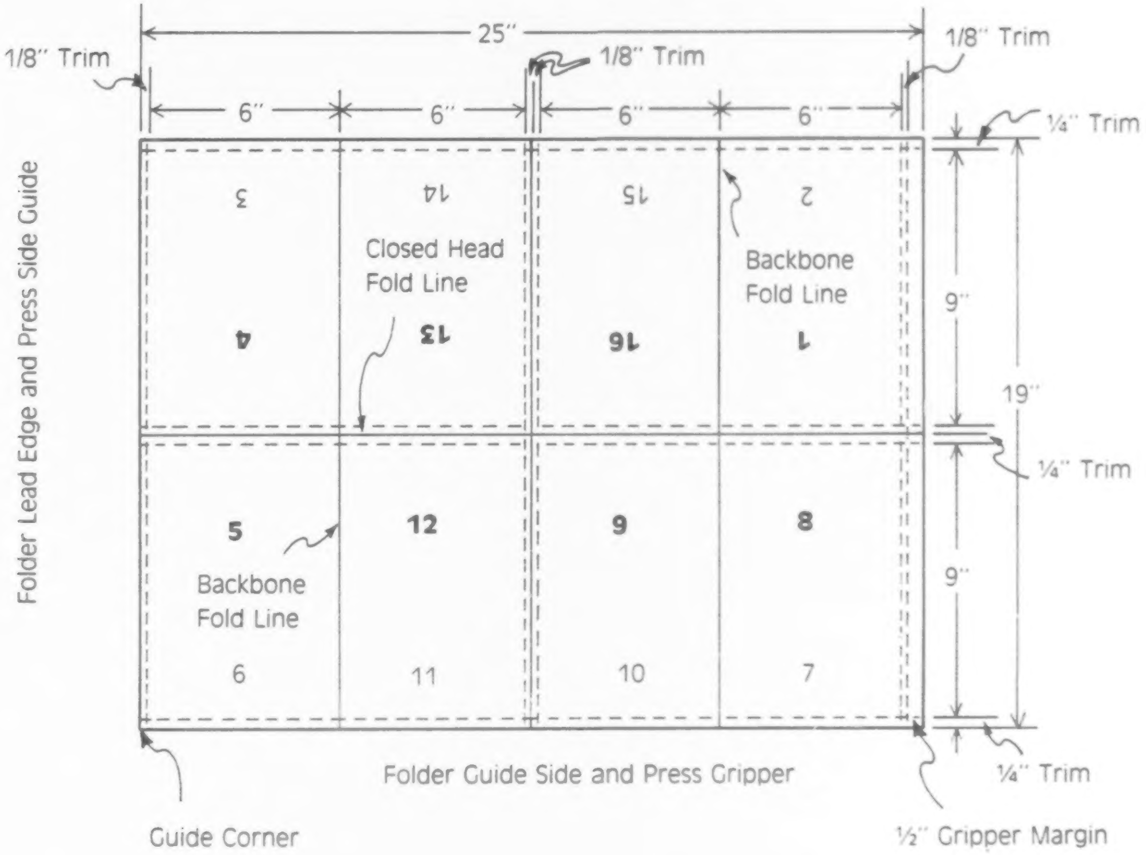
Left	Right
16	1
2	15
14	3
4	13
12	5
6	11
10	7
8	9

16-Page Printer's Spread Ladder

16. When the folding dummy is translated to an imposition layout or stripping layout, the folder headstop will become the press guide side. The folder side guide will become the edge used for the press gripper. (Figure L)

Figure L

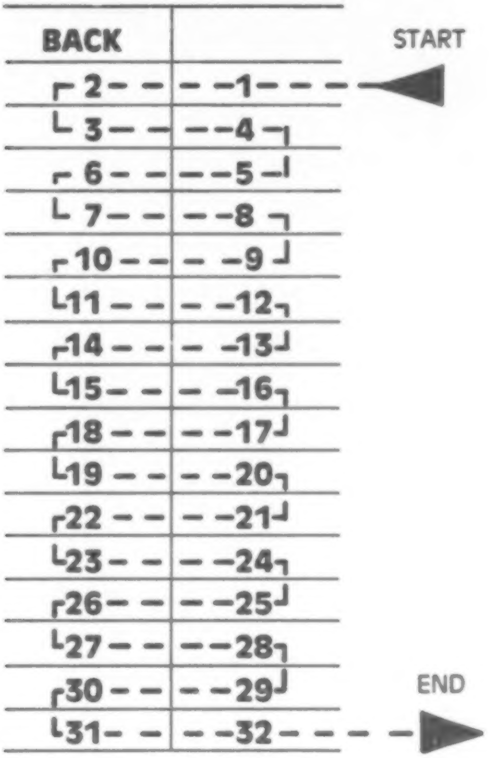
- BOLD NUMBER IS FRONT SIDE PAGE NUMBER.
- LIGHT NUMBER IS BACK SIDE PAGE NUMBER.
- SOLID LINE IS FOLD LINE.
- DASH LINE IS TRIM LINE.
- ALL BINDERY RETRIMS ARE 1/8.″


25″
1/8″ Trim
1/8″ Trim
1/8″ Trim
6″
6″
6″
6″
¼″ Trim
3
14
15
2
Closed Head Fold Line
Backbone Fold Line
4
13
16
1
9″
19″
¼″ Trim
5
12
9
8
Backbone Fold Line
9″
6
11
10
7
Folder Lead Edge and Press Side Guide
Folder Guide Side and Press Gripper
¼″ Trim
Guide Corner
½″ Gripper Margin

HO 6

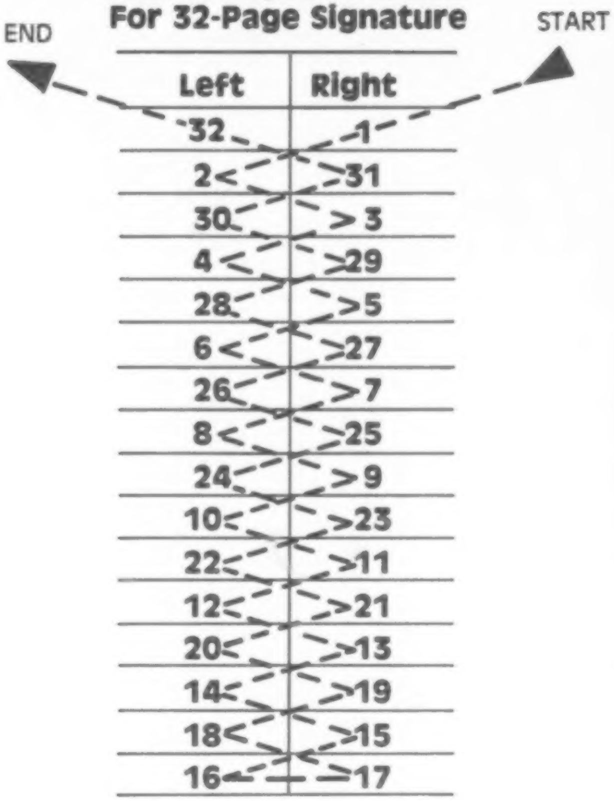
Front and Back Ladder; Printer's Spread Ladder

Front and Back Ladder For 32-Page Signature



BACK	
2	1
3	4
6	5
7	8
10	9
11	12
14	13
15	16
18	17
19	20
22	21
23	24
26	25
27	28
30	29
31	32

Printer's Spread Ladder For 32-Page Signature



Left	Right
32	1
2	31
30	3
4	29
28	5
6	27
26	7
8	25
24	9
10	23
22	11
12	21
20	13
14	19
18	15
16	17

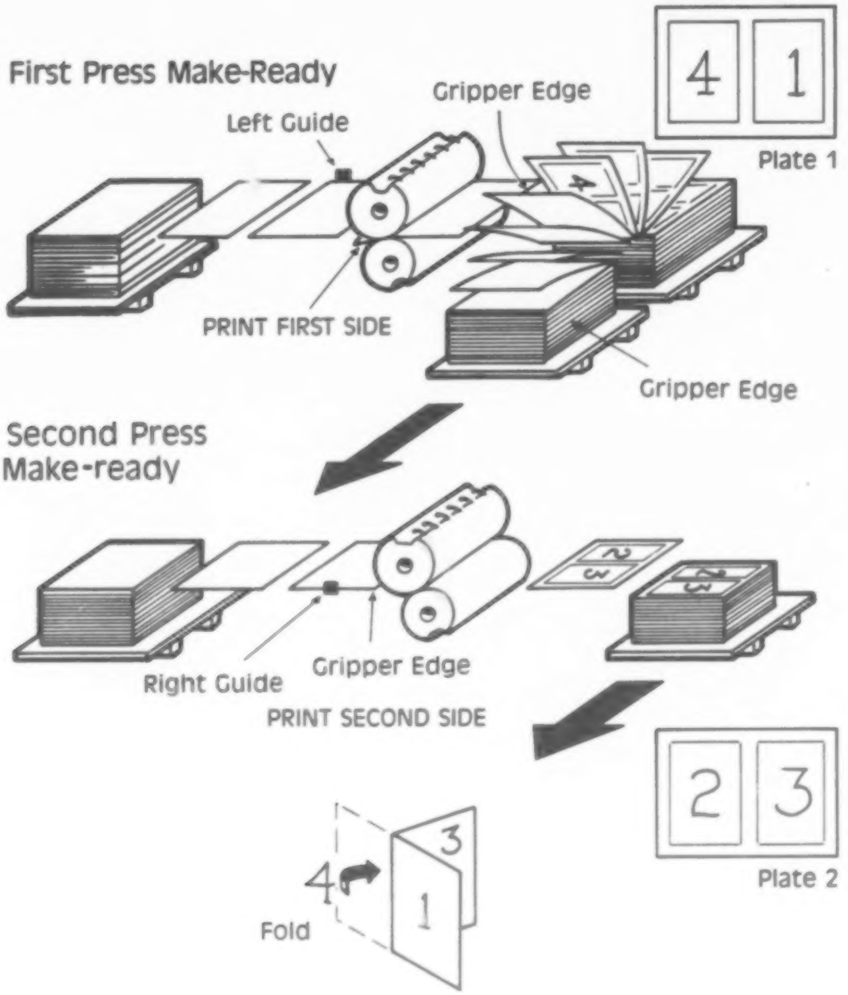
The front and back ladder is used for planning the signature to see which pages will be on the front of the form and which will be on the back. This ladder is constructed as shown by the arrow.

The front and back ladder is handy for planning jobs when only spot color is being used. Considerable savings can be achieved if all the color can be restricted to one side of the form.

The printer's spread ladder shows which pages will be adjacent during printing so that the signature will fold correctly. The sum of the folios of adjacent pages should equal one more than the total pages in the signature. Most advertising agencies furnish camera art (mechanicals) in "reader's spreads;" i.e., pages 2 and 3; pages 4 and 5; etc. Printers will then generally lay out pages in the printer's spreads. Printer's spreads are constructed by the arrows as shown.

HO 7

Sheetwise (Work and Back) Imposition

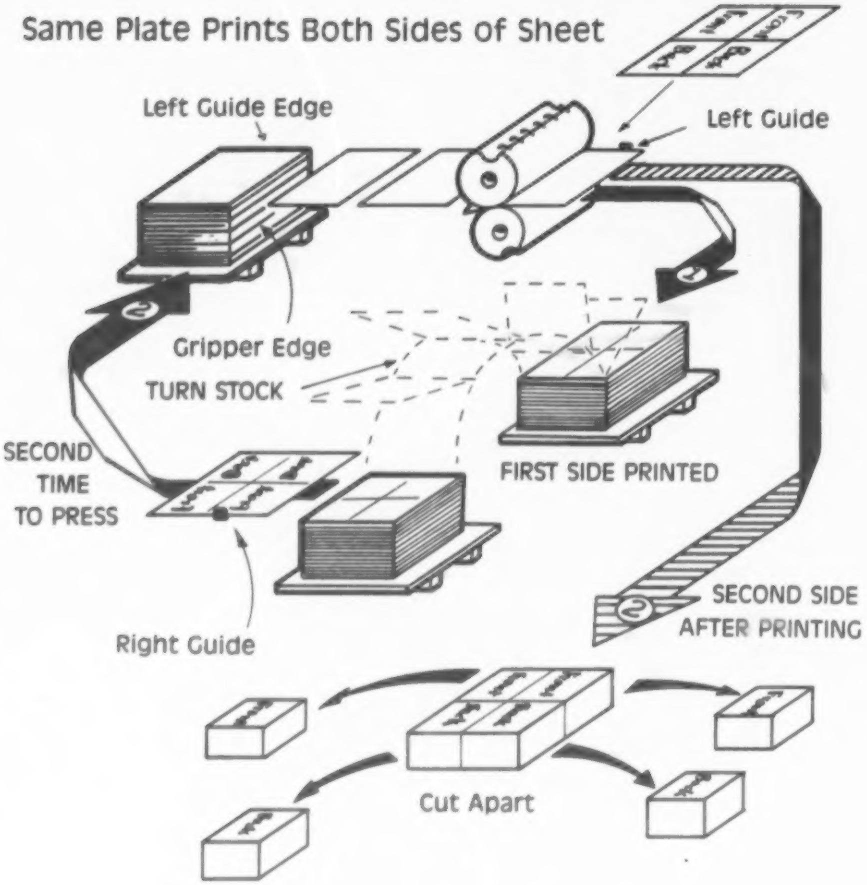

First Press Make-Ready
Gripper Edge
4
1
Plate 1
Left Guide
4
PRINT FIRST SIDE
Gripper Edge
Second Press
Make-ready
2
3
2
3
Right Guide
Gripper Edge
PRINT SECOND SIDE
2
3
Plate 2
3
4
1
Fold

Features of Sheetwise

1. Also called "work and back"
2. One color job requires two plates
3. Same sheet gripper edge and sheet side guide used for backup
4. Job size can approximately equal press capacity
5. Good front-to-back registration achieved
6. Lends itself to gang processing (folding, etc.)
7. More make-ready time required than with work and turn or work and flop
8. Requires changing press side guide for good front-to-back registration

Work and Turn Imposition

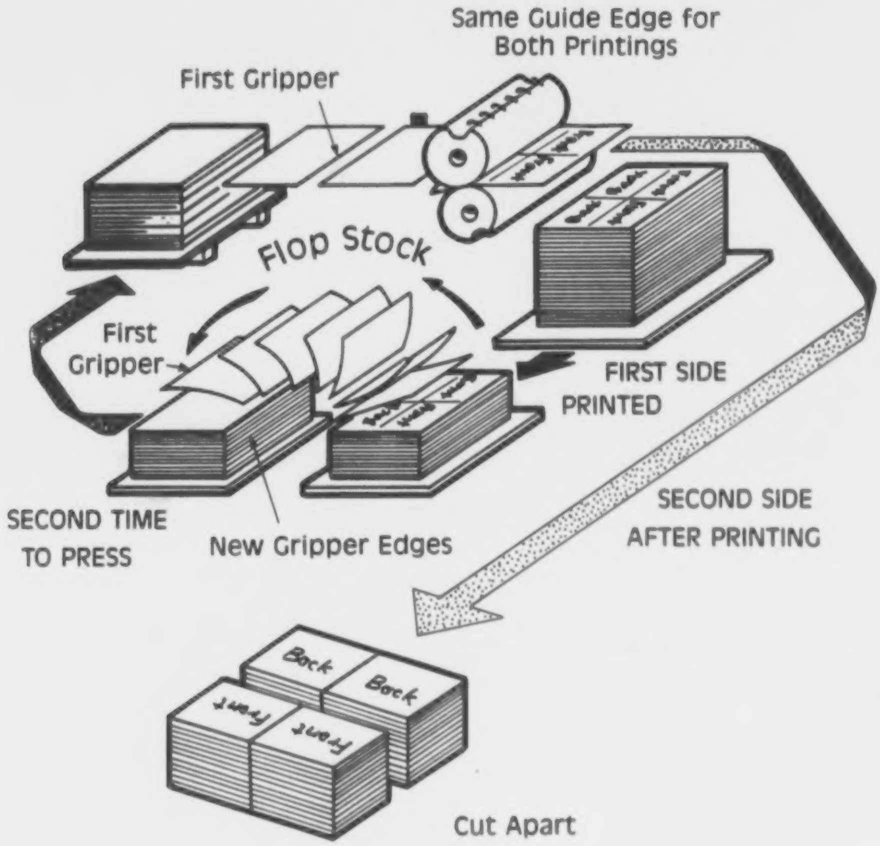
Same Plate Prints Both Sides of Sheet


Front
Front
Back
Back
Left Guide Edge
Left Guide
1
2
Gripper Edge
TURN STOCK
SECOND TIME TO PRESS
FIRST SIDE PRINTED
Right Guide
2
SECOND SIDE AFTER PRINTING
Cut Apart

Features of Work and Turn

1. Preferred over work and flop
2. One color job requires one plate
3. Same sheet gripper edge and sheet sideguide used for backup
4. Maximum job size is half press capacity
5. Good front to back registration achieved
6. Minimizes make-ready time for two-sided job
7. Requires changing press sideguide for good front-to-back registration
8. Will result in at least two jobs from each press sheet; requires cutting *after* printing
9. Does not lend itself to gang processing (folding, etc.)
10. Cannot use on duplex stock

Work and Flop Imposition

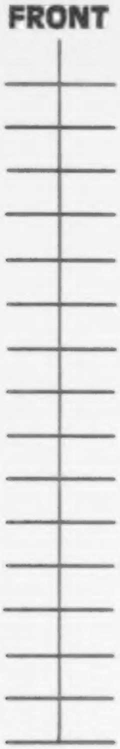

Same Guide Edge for Both Printings
First Gripper
Flop Stock
First Gripper
FIRST SIDE PRINTED
SECOND SIDE AFTER PRINTING
SECOND TIME TO PRESS
New Gripper Edges
Back
Back
Front
Front
Cut Apart

Features of Work and Flop

1. Also called "work and tumble" and "work and roll"
2. Sheet gripper edge changes for backup; sideguide remains same
3. Requires twice as much gripper margin allowance on press sheet
4. Poor front to back registration
5. One color job requires one plate
6. Maximum job size is half press capacity
7. Minimizes make-ready time for two-sided job
8. Press sideguide remains on same side for backup
9. Will result in at least two jobs from each press sheet; requires cutting after printing
10. Does not lend itself to gang processing (folding, etc.)

ASSIGNMENT SHEET 1–PLANNING OFFSET PRODUCTION

Part I Make a printer's spread ladder for a 32-page, saddle stitch booklet. (Fill in the folios in the blank ladder below.)



1. Explain what each left-right pair of numbers represents.

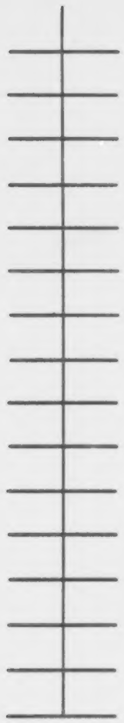
2. What is the mathematical relationship of each pair of these numbers to any other pair?

3. What is the mathematical relationship of each pair of numbers to the number of pages in the booklet?

4. Define "folio."

(CONTINUED ON NEXT PAGE)

Part II Make a front/back ladder of a 32-page saddle stitch booklet.



1. What do these numbers represent?

2. Explain how you might use this relationship in planning a booklet job.

Part III List two disadvantages of work and flop press imposition as compared to work and turn.

1.

2.

Part IV Diagram a 2-out W/T press imposition of a 12 x 18 broadside.

Part V Compare the step and repeat process to multiple image stripping.

ANSWERS TO ASSIGNMENT SHEET

ANSWERS TO ASSIGNMENT SHEET 1 - PLANNING OFFSET PRODUCTION

Part I

LEFT	RIGHT
32	1
2	31
30	3
4	29
28	5
6	27
26	7
8	25
24	9
10	23
22	11
12	21
20	13
14	19
18	15
16	17

1. Each left-right pair of numbers represents the pages which will be adjacent during printing so that the signature will fold correctly.

2. Their sums are the same.

3. The sums of each pair always equals one more than the total number of pages in the signature.

4. The printed page number.

Part II

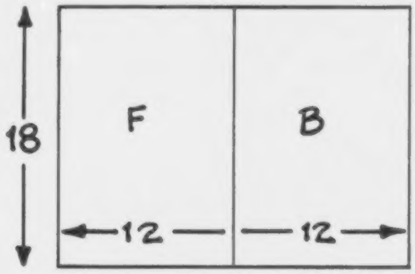
BACK	FRONT
2	1
3	4
6	5
7	8
10	9
11	12
14	13
15	16
18	17
19	20
22	21
23	24
26	25
27	28
30	29
31	32

1. Each pair of numbers represents a page on the front and a page on the back of the form.
2. The front and back ladder is handy for planning jobs when only spot color is being used. Considerable savings can be achieved if all the color can be restricted to one side of the form. This ladder may also be used to check that the folding dummy and stripper's layout is properly made.

Part III

1. Requires twice the margin of paper allowed for gripper.
2. Poor front-to-back registration.

Part IV



Part V

1. Step and repeat uses the same negative and re-exposes it a number of times in predetermined positions.
2. Multiple image stripping utilizes separate negatives for each image which are fastened together in position.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

SCOPE OF UNIT:

This unit includes, by way of introduction, basic knowledge of the printing processes with special emphasis towards offset lithography, its historical past and its technological development. This unit covers production planning, cost estimating, costing, cost accounting, scheduling, production control, purchasing, and inventory as these topics relate to the processing of the job order.

INFORMATION TOPIC: I-3 OR DEMONSTRATION:

PURCHASING MATERIALS, SUPPLIES, AND OUTSIDE SERVICES

(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Match purchasing-related terms to correct definitions.
2. Given paper samples provided by the instructor, utilize the paper sample file to determine:
   a. Brand name
   b. Company or mill
   c. Color (mill name)
   d. Basis weight
3. Given job specifications provided by the instructor, utilize the paper price book to determine:
   a. Size of stock
   b. Number of sheets needed
   c. Number of cartons of stock
   d. Cost per cwt
   e. Total cost of paper to printer
4. Given job specifications provided by the instructor, write purchase order for ink, which will include the information needed by the ink maker to fill the order.
5. List five kinds of services that often are buyouts.
6. List four specifications for proofs to be purchased as buyouts from a trade shop.

7. List four specifications for plates to be purchased as buyouts from a trade shop.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. TM 1: Paper Price Book Page
2. HO 1: Paper Price Book Pages - Book Paper
3. HO 2: Paper Price Book Pages - Business Paper
4. HO 3: Purchase Order Form
5. AS 1: Purchasing Materials, Supplies and Outside Services

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. *Lithographic Technology*. Indianapolis, IN: Bobbs-Merrill, 1980, sec. 13, units 92-94; sec. 14, units 97-99.

Dennis, Ervin A. and John D. Jenkins. *Comprehensive Graphic Arts*. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 19, units 164-165; sec. 20, unit 171.

REFERENCES:

Birkett, William H. *Graphic Arts Estimating*. Arlington, VA: Printing Industries of America, 1978, chs. 5-7.

Blair, Raymond N., ed. *The Lithographer's Manual*. 7th ed. Pittsburgh, PA: The Graphic Arts Technical Foundation, 1983, ch. 13, pp. 36-46.

Ruggles, Philip K. *Printing Estimating*. 2nd ed. North Scituate, MA: Breton Publishers, 1985, ch. 6, pp. 154-179; ch. 7, pp. 205-206.

INTRODUCTION:

No printing company, regardless of size, is totally self-sufficient. It is therefore a necessity to purchase (a) materials (needed for a specific job), (b) supplies (needed for the general operation of the company), and (c) outside services ("buyouts" of manufactured components of the job). This lesson presents information necessary to understand this important management function and will explore purchasing as it relates to "processing the order."

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

OUTLINE: (Key Points)

I. Terms Used in Purchasing for Printing

A. Accounts payable - money owed to a supplier or other vendor by the printer for materials, supplies or services

B. After receipt of order (ARO) - in quoting a job, delivery time will normally be stated in terms of ARO. Example "6 weeks ARO" means that after the order has been received, six weeks will be required for production and delivery.

C. Buyer - an official of a company charged with purchasing materials, supplies, and services for a company; usually reports to the purchasing agent; generally specializes in a particular type of purchasing

D. cwt - 100 pounds; simply, "hundred weight" is a term used in commerce meaning 100 pounds. Paper, the printer's commodity, is sold by the "hundred weight" or cwt.

E. Dealer - a company that may be a retailer or a distributor, depending on the product or to whom it is selling

F. Discount - the amount that may be deducted from a bill for prompt payment or for other considerations

G. Distributor - a company that provides the necessary step between the manufacturer and the retailer; the distributor will normally carry the product line of several manufacturers and will represent them with a sales staff.

H. Freight on board (FOB) - the location from which a customer pays freight; for example: an order sent from Kansas City to St. Louis shipped "FOB St. Louis" means the shipper pays all freight charges. A similar order sent from Kansas City to St. Louis "FOB Kansas City" means the buyer will pay all freight charges.

I. Inventory - the items represented on a listing of all unsold materials and supplies (also other property); inventory sometimes relates to the value of said materials.

J. List - the price at which goods are sold to the consumer; this is generally the highest in a long chain of markups. (See Retail.)

K. Net - the amount charged for an order after any discounts, taxes, freight, and other charges are deducted

L. Purchase order (PO) - a written order to purchase supplies or materials; usually carries a control number (PO number) and the signature of the authorizing officer

M. Purchasing agent - a company official charged with all the responsibilities of purchasing materials, supplies, and services for a company; in larger companies, several buyers will report to this position.

N. Retail - the price at which goods are sold to the consumer (See List.)

O. Sales representative (sales rep.) - a salesperson who represents a particular company (sometimes several companies or product lines) and who works with potential customers to provide the materials, supplies and services needed

P. Terms - an agreement concerning how, when, and amount of payment to be made for purchased goods or services; these terms are usually stated in the purchase order and agreed to in the order acknowledgment; any discounts, interest rates, or advance payments would be "terms"

Q. Wholesale - the price at which goods are sold in large quantities to retailers and jobbers; this is a discounted price somewhat below retail.

II. Purchase of Materials

A. Materials - consumable items of production that are quantifiable and traceable to a particular job for a particular customer; examples: film, plates, paper, etc.

1. Direct vs. indirect costs

2. Purchasing for customer's job

    3. Purchasing from inventory
    4. Assessing the value of materials
    5. Markup and/or handling charges

- B. Establishing an account with supplier
    1. Catalogs (TM 1, HO 1, HO 2)
    2. Sample files (HO 3)
    3. Quantity discounts
    4. Guarantees and credits
    5. Allotments

III. Purchase of Supplies

- A. Supplies - consumable items of production that are not traceable to any one job (project) or customer; examples: solvents, fountain solution, blankets, cotton wipes, opaque, etc.
- B. Purchasing supplies
    1. Catalogs
    2. Quantity discounts
    3. Standardization of supplies
    4. Specifying supply data

IV. Buyouts

- A. Purchase of outside services
- B. Direct cost items charged directly to particular jobs
- C. Trade shop - most common
    1. Trade bindery services
    2. Color separations
    3. Creative art and illustration
    4. Air brushing
    5. Typesetting

D. In-house vs. outside

1. Advantages of a printer maintaining equipment and personnel necessary to be a comprehensive lithographer are:

   a. Profit made on that operation is kept by the printer rather than the trade house.

   b. The printer is not at the mercy of a trade house schedule to complete the job.

   c. It allows the printer to bid on jobs that otherwise would not be attempted.

2. Disadvantages of a printer maintaining all equipment and personnel to be comprehensive are:

   a. Specialized equipment may stand idle much of the time thereby not providing a good return on the investment.

   b. Maintaining personnel with the necessary skills to operate seldom-used equipment may mean a larger than necessary payroll or excessive personnel layoffs.

   c. Space needed for seldom-used equipment may be put to better use.

3. When to buy out - some considerations given to the decision of producing in-house or buying out are:

   a. Length of job

   b. Complexities of job

   c. Other in-house work competing for equipment and personnel time

   d. Quality and cost of trade house services available

   e. Shipping and delivery costs to and from trade house

4. Trade shop vs. service from competitor

E. Establishing trade shop relationships

1. Service

2. Quality

3. Price

F. Hidden costs

1. Shipping

2. Lost revenue

3. Investment in little-used equipment

G. Specifications for buyouts

1. Specifications for purchasing proofs

a. Type of proof

b. Number of copies

c. Assembled or unassembled

d. Purpose of proofs

2. Specifications for purchasing plates

a. Size and quantity of job

b. Size of plate

c. Delivery due date and delivery instructions

d. Press type

V. Summary and Conclusion

A. Terms used in purchasing for printing

B. Purchase of materials

C. Purchase of supplies

D. Buyouts

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

INTERACTION ITEMS:

1. What is the role of trade shops (trade houses) in the graphic arts industry?

2. Relate the purchasing function to the estimating and job planning functions.

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Using a copy of the city yellow pages, identify those printing related companies that are trade shops. Have students determine which services they offer.

2. Invite a salesperson or representative of a trade shop, paper house, and/or ink mill to talk with the class. These talks should stress marketing, not technology.

3. Discuss each of the terms listed in the outline as they relate to purchasing in the graphic arts industry.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

EVALUATION ITEMS:

Match the following purchasing terms to correct definitions.

______ 1. Purchase order
______ 2. Terms
______ 3. Accounts payable
______ 4. Net
______ 5. Discount
______ 6. FOB
______ 7. ARO
______ 8. Buyer
______ 9. Purchasing agent
______10. Sales rep.
______11. Distributor
______12. Dealer
______13. List
______14. Wholesale
______15. Retail
______16. Inventory
______17. cwt
______18. Materials
______19. Supplies

a. An official of a company who specializes in a particular type of purchasing materials, supplies and services for a company

b. Consumable items of production that are not traceable to any one job or customer

c. An agreement concerning how, when and amount of payment to be made for purchased goods or services

d. The locations from which a customer pays freight

e. The amount of time required for delivery and production after an order is received

f. Price at which goods are sold to the consumer

g. 100 lbs.

h. Consumable items of production that are quantifiable and traceable to a particular job for a particular customer

i. A written document needed to buy supplies or materials

j. The amount that may be deducted from a bill for prompt payment or other considerations

k. The person who works with potential customers to provide needed services, supplies, or materials

l. A company that may be a retailer or distributor, depending on the product or to whom it is selling

m. A company official to whom several buyers generally report and who is responsible for obtaining materials, supplies, and services for a company

n. Money owed to a supplier or other vendor by the printer for materials, supplies or services

o. The amount charged for an order after any discounts, taxes, freight and other charges are deducted

p. Carrier of several manufacturers' product lines represented to the retailer by a sales staff

q. Price at which goods are sold to the consumer; generally the highest in a chain of markups

r. Items represented on a listing of all unsold materials and supplies

s. Price at which goods are sold to retailers and jobbers

20. List five kinds of services that often are buyouts.

a.

b.

c.

d.

e.

21. List four specifications for proofs to be purchased as buyouts from a trade shop.

a.

b.

c.

d.

22. List four specifications for plates to be purchased as buyouts from a trade shop.

a.

b.

c.

d.

LESSON PLAN: 3

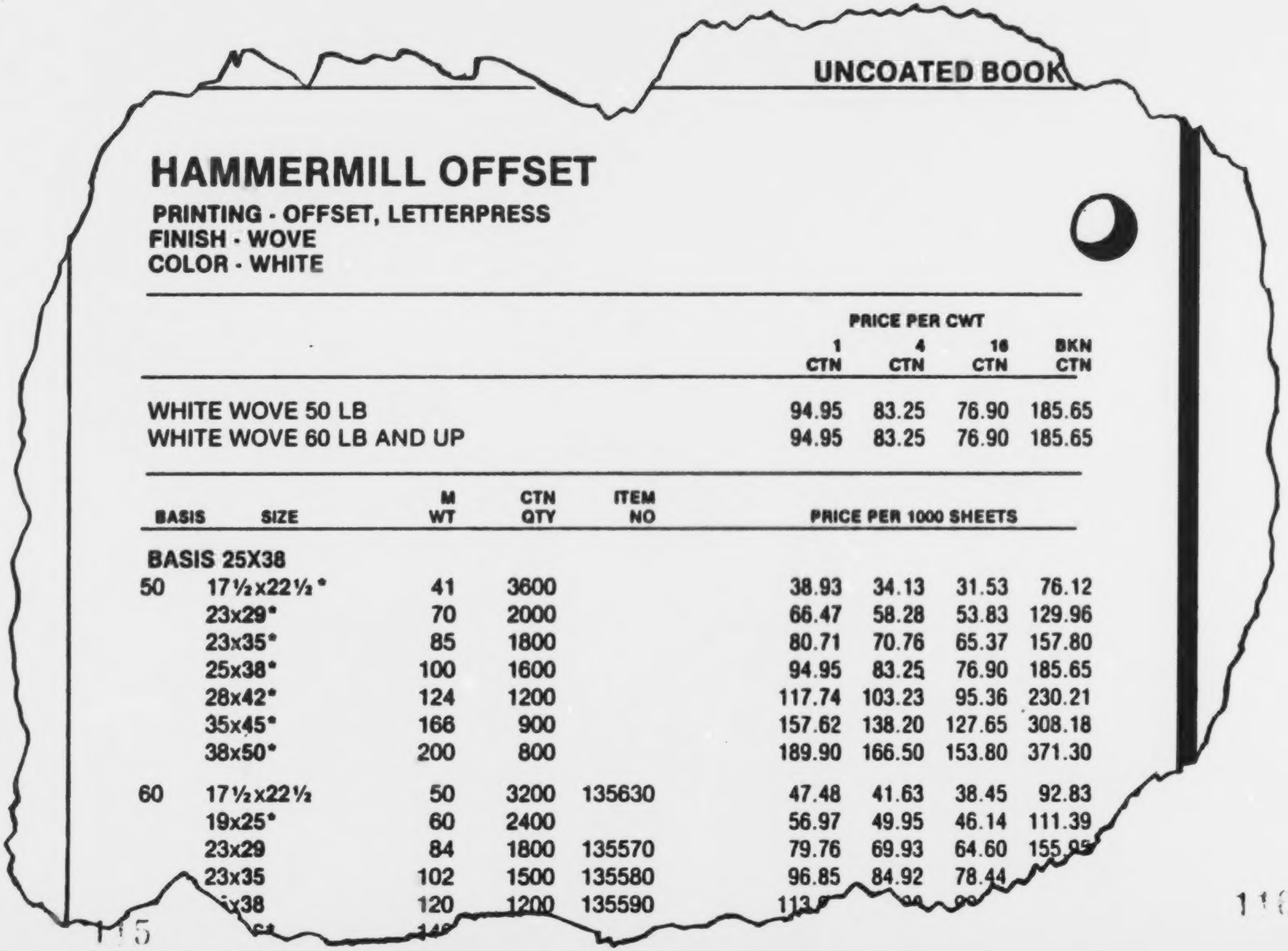
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

ANSWERS TO EVALUATION ITEMS:

1. i
2. c
3. n
4. o
5. j
6. d
7. e
8. a
9. m
10. k
11. p
12. l
13. q
14. s
15. f
16. r
17. g
18. h
19. b
20. a. Trade bindery services
    b. Color separations
    c. Creative art and illustration
    d. Air brushing
    e. Typesetting
21. a. Type of proof
    b. Number of copies
    c. Assembled or unassembled
    d. Purpose of proofs
22. a. Size and quantity of job
    b. Size of plate
    c. Delivery due date and delivery instructions
    d. Press type

Paper Price Book Page



UNCOATED BOOK

HAMMERMILL OFFSET

PRINTING - OFFSET, LETTERPRESS
FINISH - WOVE
COLOR - WHITE

	PRICE PER CWT 1 CTN	4 CTN	16 CTN	BKN CTN
WHITE WOVE 50 LB	94.95	83.25	76.90	185.65
WHITE WOVE 60 LB AND UP	94.95	83.25	76.90	185.65

BASIS	SIZE	M WT	CTN QTY	ITEM NO	PRICE PER 1000 SHEETS			
BASIS 25X38								
50	17½x22½*	41	3600		38.93	34.13	31.53	76.12
	23x29*	70	2000		66.47	58.28	53.83	129.96
	23x35*	85	1800		80.71	70.76	65.37	157.80
	25x38*	100	1600		94.95	83.25	76.90	185.65
	28x42*	124	1200		117.74	103.23	95.36	230.21
	35x45*	166	900		157.62	138.20	127.65	308.18
	38x50*	200	800		189.90	166.50	153.80	371.30
60	17½x22½	50	3200	135630	47.48	41.63	38.45	92.83
	19x25*	60	2400		56.97	49.95	46.14	111.39
	23x29	84	1800	135570	79.76	69.93	64.60	155.95
	23x35	102	1500	135580	96.85	84.92	78.44	
	x38	120	1200	135590	113.			

Used With Permission: Midwestern Paper Company

Paper Price Book Pages - Book Paper

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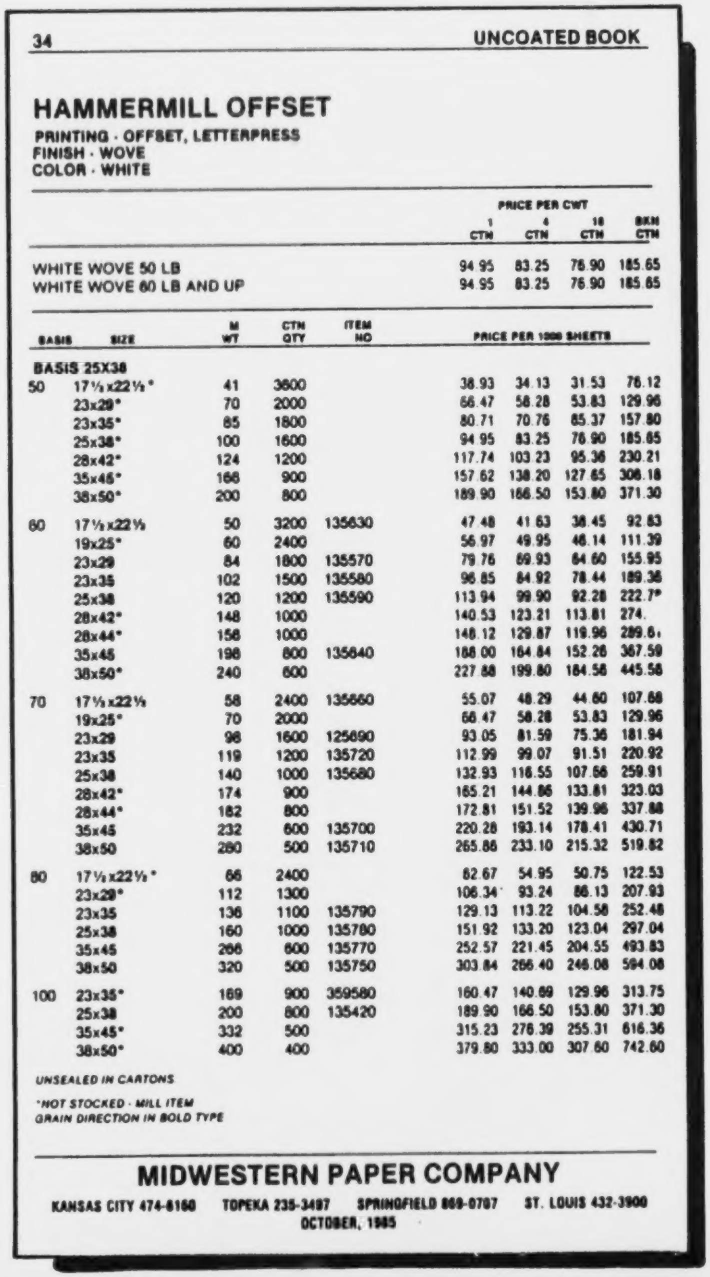
Used With Permission: Midwestern Paper Company



34 UNCOATED BOOK

HAMMERMILL OFFSET

PRINTING · OFFSET, LETTERPRESS
FINISH · WOVE
COLOR · WHITE

	PRICE PER CWT 1 CTN	4 CTN	16 CTN	BKN CTN
WHITE WOVE 50 LB	94.95	83.25	76.90	185.65
WHITE WOVE 60 LB AND UP	94.95	83.25	76.90	185.65

BASIS	SIZE	M WT	CTN QTY	ITEM NO	PRICE PER 1000 SHEETS			
BASIS 25X38								
50	17½x22½*	41	3600		38.93	34.13	31.53	76.12
	23x29*	70	2000		66.47	58.28	53.83	129.96
	23x35*	85	1800		80.71	70.76	65.37	157.80
	25x38*	100	1600		94.95	83.25	76.90	185.65
	28x42*	124	1200		117.74	103.23	95.36	230.21
	35x45*	166	900		157.62	138.20	127.65	308.18
	38x50*	200	800		189.90	166.50	153.80	371.30
60	17½x22½	50	3200	135630	47.48	41.63	38.45	92.83
	19x25*	60	2400		56.97	49.95	46.14	111.39
	23x29	84	1800	135570	79.76	69.93	64.60	155.95
	23x35	102	1500	135580	96.85	84.92	78.44	189.36
	25x38	120	1200	135590	113.94	99.90	92.28	222.7*
	28x42*	148	1000		140.53	123.21	113.81	274.
	28x44*	158	1000		148.12	129.87	119.96	289.6
	35x45	198	800	135640	188.00	164.84	152.26	367.59
	38x50*	240	600		227.88	199.80	184.56	445.56
70	17½x22½	58	2400	135660	55.07	48.29	44.60	107.68
	19x25*	70	2000		66.47	58.28	53.83	129.96
	23x29	98	1600	125690	93.05	81.59	75.36	181.94
	23x35	119	1200	135720	112.99	99.07	91.51	220.92
	25x38	140	1000	135680	132.93	116.55	107.66	259.91
	28x42*	174	900		165.21	144.86	133.81	323.03
	28x44*	182	800		172.81	151.52	139.96	337.88
	35x45	232	600	135700	220.28	193.14	178.41	430.71
	38x50	280	500	135710	265.86	233.10	215.32	519.82
80	17½x22½*	66	2400		62.67	54.95	50.75	122.53
	23x29*	112	1300		106.34	93.24	86.13	207.93
	23x35	136	1100	135790	129.13	113.22	104.58	252.48
	25x38	160	1000	135780	151.92	133.20	123.04	297.04
	35x45	266	600	135770	252.57	221.45	204.55	493.83
	38x50	320	500	135750	303.84	266.40	246.08	594.08
100	23x35*	169	900	359580	160.47	140.69	129.96	313.75
	25x38	200	800	135420	189.90	166.50	153.80	371.30
	35x45*	332	500		315.23	276.39	255.31	616.36
	38x50*	400	400		379.80	333.00	307.60	742.60

UNSEALED IN CARTONS

**NOT STOCKED · MILL ITEM*
GRAIN DIRECTION IN BOLD TYPE

MIDWESTERN PAPER COMPANY

KANSAS CITY 474-6160 TOPEKA 235-3497 SPRINGFIELD 869-0707 ST. LOUIS 432-3900
OCTOBER, 1985

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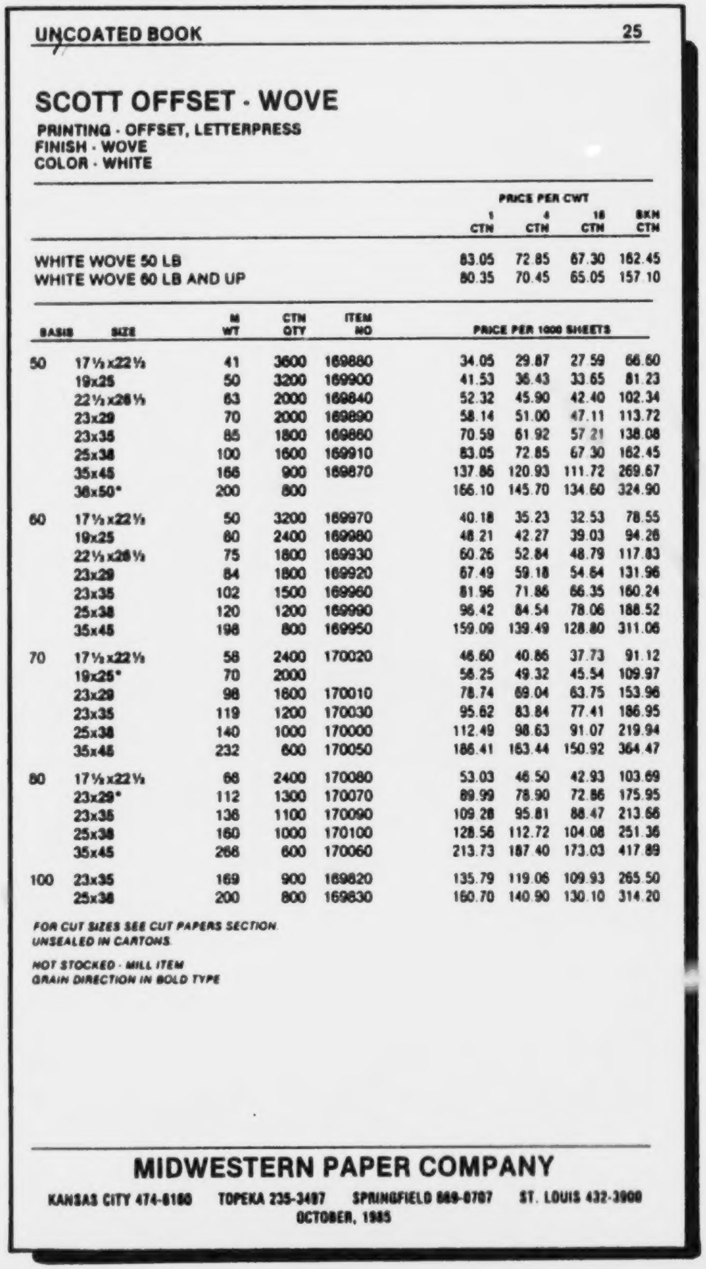

UNCOATED BOOK 25

SCOTT OFFSET · WOVE

PRINTING · OFFSET, LETTERPRESS
FINISH · WOVE
COLOR · WHITE

	PRICE PER CWT 1 CTN	4 CTN	16 CTN	BKN CTN
WHITE WOVE 50 LB	83.05	72.85	67.30	162.45
WHITE WOVE 60 LB AND UP	80.35	70.45	65.05	157.10

BASIS	SIZE	M WT	CTN QTY	ITEM NO	PRICE PER 1000 SHEETS			
50	17½x22½	41	3600	169880	34.05	29.87	27.59	66.60
	19x25	50	3200	169900	41.53	36.43	33.65	81.23
	22½x28½	63	2000	169840	52.32	45.90	42.40	102.34
	23x29	70	2000	169890	58.14	51.00	47.11	113.72
	23x35	85	1800	169860	70.59	61.92	57.21	138.08
	25x38	100	1600	169910	83.05	72.85	67.30	162.45
	35x45	166	900	169870	137.86	120.93	111.72	269.67
	38x50*	200	800		166.10	145.70	134.60	324.90
60	17½x22½	50	3200	169970	40.18	35.23	32.53	78.55
	19x25	60	2400	169980	48.21	42.27	39.03	94.26
	22½x28½	75	1800	169930	60.26	52.84	48.79	117.83
	23x29	84	1800	169920	67.49	59.18	54.64	131.96
	23x35	102	1500	169960	81.96	71.86	66.35	160.24
	25x38	120	1200	169990	96.42	84.54	78.06	188.52
	35x45	198	800	169950	159.09	139.49	128.80	311.06
70	17½x22½	58	2400	170020	46.60	40.86	37.73	91.12
	19x25*	70	2000		56.25	49.32	45.54	109.97
	23x29	98	1600	170010	78.74	69.04	63.75	153.96
	23x35	119	1200	170030	95.62	83.84	77.41	186.95
	25x38	140	1000	170000	112.49	98.63	91.07	219.94
	35x45	232	600	170050	186.41	163.44	150.92	364.47
80	17½x22½	68	2400	170080	53.03	46.50	42.93	103.69
	23x29*	112	1300	170070	89.99	78.90	72.86	175.95
	23x35	136	1100	170090	109.28	95.81	88.47	213.66
	25x38	160	1000	170100	128.56	112.72	104.08	251.36
	35x45	268	600	170060	213.73	187.40	173.03	417.89
100	23x35	169	900	169820	135.79	119.06	109.93	265.50
	25x38	200	800	169830	160.70	140.90	130.10	314.20

FOR CUT SIZES SEE CUT PAPERS SECTION.
UNSEALED IN CARTONS.

NOT STOCKED · MILL ITEM
GRAIN DIRECTION IN BOLD TYPE

MIDWESTERN PAPER COMPANY

KANSAS CITY 474-6160 TOPEKA 235-3497 SPRINGFIELD 869-0707 ST. LOUIS 432-3900
OCTOBER, 1985

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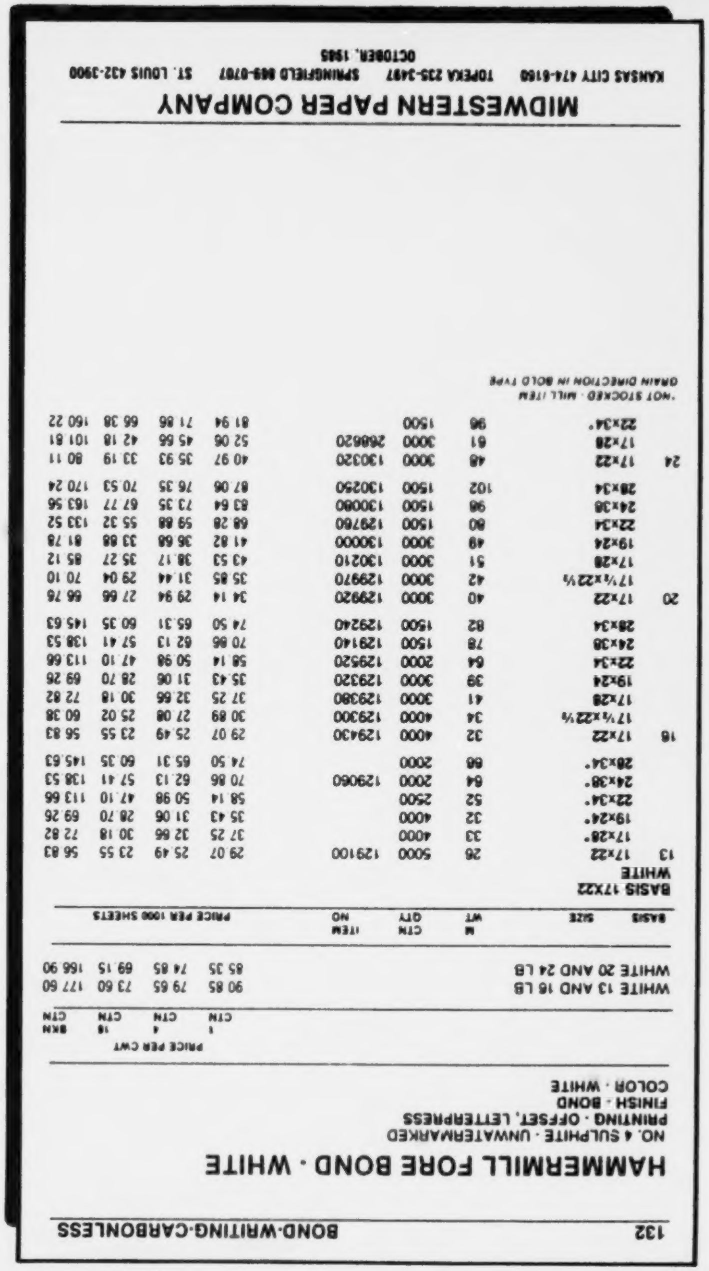
HO.1

Paper Price Book Pages - Business Paper



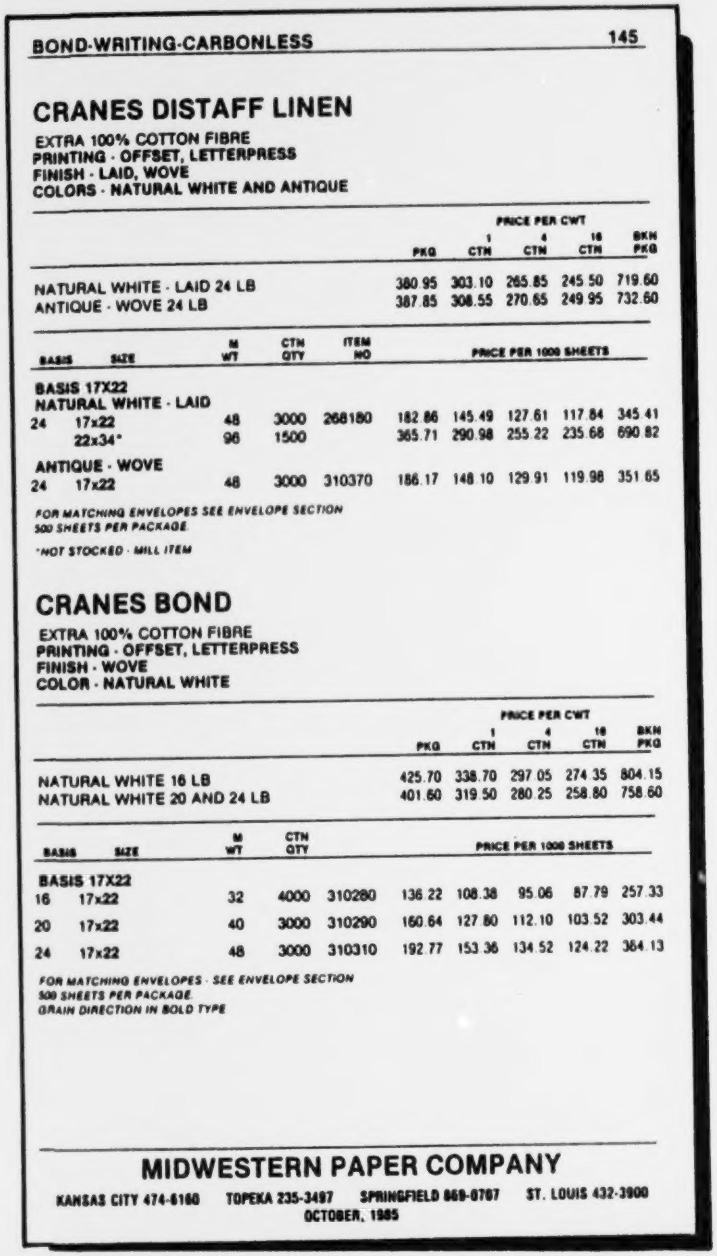
HAMMERMILL FORE BOND · WHITE

NO. 4 SULPHITE · UNWATERMARKED
PRINTING · OFFSET, LETTERPRESS
FINISH · BOND
COLOR · WHITE

	PRICE PER CWT 1 CTN	4 CTN	16 CTN	BKN CTN
WHITE 13 AND 16 LB	90.85	79.65	73.60	177.60
WHITE 20 AND 24 LB	85.35	74.85	69.15	166.90

BASIS	SIZE	M WT	CTN QTY	ITEM NO	PRICE PER 1000 SHEETS			
BASIS 17X22 WHITE								
13	17x22	26	5000	129100	29.07	25.49	23.55	56.83
	17x28*	33	4000		37.25	32.66	30.18	72.82
	19x24*	32	4000		35.43	31.06	28.70	69.26
	22x34*	52	2500		58.14	50.98	47.10	113.66
	24x38*	64	2000	129060	70.86	62.13	57.41	138.53
	28x34*	66	2000		74.50	65.31	60.35	145.63
16	17x22	32	4000	129430	29.07	25.49	23.55	56.83
	17½x22½	34	4000	129300	30.89	27.08	25.02	60.38
	17x28	41	3000	129380	37.25	32.66	30.18	72.82
	19x24	39	3000	129320	35.43	31.06	28.70	69.26
	22x34	64	2000	129520	58.14	50.98	47.10	113.66
	24x38	78	1500	129140	70.86	62.13	57.41	138.53
	28x34	82	1500	129240	74.50	65.31	60.35	145.63
20	17x22	40	3000	129920	34.14	29.94	27.66	66.76
	17½x22½	42	3000	129970	35.85	31.44	29.04	70.10
	17x28	51	3000	130210	43.53	38.17	35.27	85.12
	19x24	49	3000	130000	41.82	36.68	33.88	81.78
	22x34	80	1500	129760	68.28	59.88	55.32	133.52
	24x38	98	1500	130080	83.64	73.35	67.77	163.56
	28x34	102	1500	130250	87.06	76.35	70.53	170.24
24	17x22	48	3000	130320	40.97	35.93	33.19	80.11
	17x28	61	3000	268620	52.06	45.66	42.18	101.81
	22x34*	96	1500		81.94	71.86	66.38	160.22

**NOT STOCKED · MILL ITEM*
GRAIN DIRECTION IN BOLD TYPE



CRANES DISTAFF LINEN

EXTRA 100% COTTON FIBRE
PRINTING · OFFSET, LETTERPRESS
FINISH · LAID, WOVE
COLORS · NATURAL WHITE AND ANTIQUE

	PRICE PER CWT PKG	1 CTN	4 CTN	16 CTN	BKN PKG
NATURAL WHITE · LAID 24 LB	380.95	303.10	265.85	245.50	719.60
ANTIQUE · WOVE 24 LB	387.85	308.55	270.65	249.95	732.60

BASIS	SIZE	M WT	CTN QTY	ITEM NO	PRICE PER 1000 SHEETS				
BASIS 17X22 NATURAL WHITE · LAID									
24	17x22	48	3000	268180	182.86	145.49	127.61	117.84	345.41
	22x34*	96	1500		365.71	290.98	255.22	235.68	690.82
ANTIQUE · WOVE									
24	17x22	48	3000	310370	186.17	148.10	129.91	119.98	351.65

FOR MATCHING ENVELOPES SEE ENVELOPE SECTION
500 SHEETS PER PACKAGE

**NOT STOCKED · MILL ITEM*

CRANES BOND

EXTRA 100% COTTON FIBRE
PRINTING · OFFSET, LETTERPRESS
FINISH · WOVE
COLOR · NATURAL WHITE

	PRICE PER CWT PKG	1 CTN	4 CTN	16 CTN	BKN PKG
NATURAL WHITE 16 LB	425.70	338.70	297.05	274.35	804.15
NATURAL WHITE 20 AND 24 LB	401.60	319.50	280.25	258.80	758.60

BASIS	SIZE	M WT	CTN QTY		PRICE PER 1000 SHEETS				
BASIS 17X22									
16	17x22	32	4000	310280	136.22	108.38	95.06	87.79	257.33
20	17x22	40	3000	310290	160.64	127.80	112.10	103.52	303.44
24	17x22	48	3000	310310	192.77	153.36	134.52	124.22	364.13

FOR MATCHING ENVELOPES · SEE ENVELOPE SECTION
500 SHEETS PER PACKAGE
GRAIN DIRECTION IN BOLD TYPE

Used With Permission: Midwestern Paper Company

HO 2

HO 3

Purchase Order Form

PURCHASE ORDER NO. (P.D. use)

REQUISITION NUMBER

DATE OF REQUEST	DATE REQUIRED	PURCHASE ORDERED FROM (P.D. use)	DEPARTMENT CHARGED
DELIVER TO: (Room No., Bldg., Name of Receiver)			ACCOUNT NAME
			11 DIGIT ACCOUNT NUMBER
			SIGNATURE (DEPT. CHAIR. OR AUTH. REP.)

QTY.	DESCRIPTION OF ITEMS	EST. COST	ACTUAL COST (P.D. use)

SOURCES OF SUPPLY

FOR PURCHASING DEPT. USE ONLY

BID NO.

QUOTE DATED

DELIVERY DATE

F.O.B. *

TERMS

APPROVED

UMUW FORM 10 (REV MAR 82)

PURCHASING

ASSIGNMENT SHEET 1--PURCHASING MATERIALS, SUPPLIES, AND OUTSIDE SERVICES

Part I

Using the paper samples provided by your instructor, search the paper sample file to find a comparable sheet.

1. What is the brand name? ____________________
2. What is the company or mill (if different from brand)? ____________________ ____________________
3. What is the color? ____________________
4. What is the basis weight? ____________________

Part II

After defining the above information, locate the paper in the paper price book (catalog). Using the job specifications provided by your instructor, determine the following:

1. Size of stock: ____________________
2. Number of sheets needed: ____________________
3. Number of cartons of stock: ____________________
4. Cost per cwt: ____________________
5. Total cost of paper to printer: $ ____________________

Part III

Using the ink color book and job specifications provided by your instructor, write an order for ink for the job. What data does your ink maker need to have to fill your order?

ANSWERS TO ASSIGNMENT SHEET

ANSWERS TO ASSIGNMENT SHEET 1 - PURCHASING MATERIALS, SUPPLIES, AND OUTSIDE SERVICES

The answers to parts I, II, and III will be determined by the type of paper sample and the particular job specifications provided by the instructor. Students should demonstrate the ability to utilize the paper sample file, the paper price book and the ink color book to complete this assignment. They should also be able to fill out a purchase order to complete part III.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

SCOPE OF UNIT:

This unit includes, by way of introduction, basic knowledge of the printing processes with special emphasis towards offset lithography, its historical past and its technological development. This unit covers production planning, cost estimating, costing, cost accounting, scheduling, production control, purchasing, and inventory as these topics relate to the processing of the job order.

INFORMATION TOPIC: I-4 OR DEMONSTRATION:

COST ACCOUNTING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Define cost accounting.
2. Define direct costs.
3. Define indirect costs.
4. List four costs allocated to a cost center.
5. List four methods of establishing production standards.
6. Identify the relationship that exists between salable hours and available hours when determining productivity.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 22.

REFERENCES:

Birkett, William H. Graphic Arts Estimating. Arlington, VA: Printing Industries of America, 1978, ch. 2.

Ruggles, Philip K. Printing Estimating. 2nd ed. North Scituate, MA: Breton Publishers, 1985, ch. 3.

INTRODUCTION:

The determination of the worth of one's product is necessary to enable a company to charge a fair but profitable price for its goods and services. Cost estimating is the process used in this determination and it is based on the process of cost accounting, i.e., the allocation of all appropriate costs to each of the process units called cost centers.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

OUTLINE: (Key Points)

I. Cost Center

  A. Cost accounting

    1. Process of collecting, separating, distributing and allocating costs across the several processes used in producing a product

    2. A necessary process in determining if a recovery of costs plus profit is being realized on each job

  B. Direct costs

    1. Costs generated by the production process that can be identified as belonging directly to a specific project or job

    2. Examples

      a. Paper to run the press for the job

      b. Hourly cost to run the press for the job

  C. Indirect costs - costs that are general and cannot be broken out of the day-to-day operation as belonging to a specific project. These may be general supply costs which can be traced to a specific cost center, but not to a specific project.

  D. Systems of collecting costs

    1. Typical cost centers

    2. By activity

    3. By machine(s)

      a. One worker

      b. Group of workers

      c. One or group of machines

  E. Accumulating costs to be allocated

    1. Costs traced to center
    2. Arbitrary assignment of nontraceable costs (indirect)
    3. Logical assignment of nontraceable costs
    4. Costs traceable to individual jobs (direct costs) are not allocated.

F. Typical costs allocated to a cost center

    1. Rent
    2. Power - can be traced to a cost center but not individual job; other utilities are overhead items.
    3. Insurance
    4. Payroll taxes
    5. Fringe benefits
    6. Overhead
        a. Indirect labor
        b. Advertising
        c. Office supplies
        d. Telephone
        e. Other utilities
        f. Management salaries, etc.
        g. Selling expense
    7. Equipment depreciation
    8. Repairs

II. All-Inclusive Hourly Rate

A. Available work hours per direct labor employee

B. Productivity - percentage rate based on:

$$\text{productivity} = \frac{\underline{\text{salable hours}}}{\text{available hours}}$$

C. Salable hours

1. Estimated - educated guess

2. Based on historical records

3. One, two, or three shifts

D. Determining hourly rate - formulas

$$\text{All-inclusive hourly rate} = \frac{\text{annual cost of cost center}}{\text{expected salable hours per year}}$$

Expected salable hours = productivity (%) x available hours

III. Other Considerations

A. Effect of adding shifts

B. Effect of overtime

C. Costs affected by wear and tear added to annual costs

D. Costs of labor added to annual costs

E. Most management, sales, insurance costs, etc., do not increase as shifts are added.

IV. Establishing Production Standards

A. Personal judgement - poor method

B. Manufacturer's specifications - poor method

C. Statistical averages based on historical records of the cost center - best basis

D. Time studies of the operation actually done at the cost center (for initial establishment of standard)

E. Time and motion analysis - measures how long operation should take, not actual time

F. Published standards of similar cost centers (for initial establishment of standard)

G. Application of the learning curve for repetitive work or repeated jobs

V. Summary and Conclusion

  A. Cost center

  B. All-inclusive hourly rate

  C. Other considerations

  D. Establishing production standards

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

INTERACTION ITEMS:

1. How does financial accounting differ from cost accounting?

2. Why is a calculation of "productivity" important in determining the hourly cost of a cost center?

3. Differentiate between "direct" and "indirect" costs.

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. As a classroom group, list as many costs (indirect) as is possible and allocate them to an individual cost center.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

EVALUATION ITEMS:

1. Define cost accounting.

2. Define direct costs.

3. Define indirect costs.

4. List four costs allocated to a cost center.
   a.
   b.
   c.
   d.

5. List four methods of establishing production standards.
   a.
   b.
   c.
   d.

6. What relationship exists between salable hours and available hours when determining productivity?

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT I : PROCESSING JOB ORDERS

ANSWERS TO EVALUATION ITEMS:

1. Cost accounting is the process of collecting, separating, distributing and allocating costs across the several processes used in producing a product. It is necessary in order to determine if recovery of cost plus profit is being realized on each job.

2. Direct costs are those generated by the production process that can be identified as belonging directly to a specific project or job. Examples are paper and hourly cost to run the press for the job.

3. Indirect costs are general costs that cannot be broken out of the day-to-day operation as belonging to a specific project. These may be general supply costs which can be traced to a specific cost center, but not to a specific project.

4. The student may list any four of the following:
   a. Rent
   b. Power
   c. Insurance
   d. Payroll taxes
   e. Fringe benefits
   f. Overhead
      (1) Indirect labor
      (2) Advertising
      (3) Office supplies
      (4) Telephone
      (5) Other utilities
      (6) Management salaries, etc.
      (7) Selling expense

   g. Equipment depreciation
   h. Repairs

5. The student may list any four of the following:
   a. Personal judgement - poor method
   b. Manufacturer's specifications - poor method
   c. Statistical averages based on historical records of the cost center - best basis
   d. Time studies of the operations actually done by the cost center
   e. Time and motion analysis - measures how long operation should take, not actual time
   f. Published standards of similar cost centers
   g. Application of the learning curve for repetitive work or repeated jobs

6. Productivity = $\frac{\text{Salable hours}}{\text{Available hours}}$

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

SCOPE OF UNIT:

The designer, working with the customer and the copywriter, is responsible for the visual impact which the printed piece will have on its audience. The designer must appraise this audience and create an appeal. This unit investigates the processes needed to control all aspects of this job.

INFORMATION TOPIC: II-1 OR DEMONSTRATION:

THE DESIGN PROCEDURE
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. List three points to consider when analyzing a job for design.
2. List four characteristics of the intended audience to consider in the design procedure.
3. List five constraints to the design and production of the job.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. Examples of special interest publications or printed pieces provided by the instructor that appeal to particular audiences:
    a. School newspaper (student audience)
    b. Trade magazine (plumber audience)
    c. Teacher's magazine (teacher audience)
    d. Cosmetic flyer (women audience)

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, section 3, unit 18.

REFERENCES:

Crow, Wendell C. Communication Graphics. Englewood Cliffs, NJ: Prentice-Hall Inc., 1986, ch. 2.

INTRODUCTION:

The importance of the audience to the design procedure cannot be overemphasized. The very reason for the existence of the design is to satisfy a need of a particular audience. The more that is understood about this group, the more effective the resulting design will be.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

OUTLINE: (Key Points)

I. Overall Analysis of the Job
  A. Purpose of intended use
  B. Permanence required - throw away, document, archival, etc.
  C. Philosophy of client's business
    1. Client's style
    2. Nature of business

II. Analysis of the Intended Audience
  A. Age
  B. Education
  C. Sex
  D. Social status
  E. Economic status
  F. Special interests or occupation of audience
  G. Size of audience
  H. Ethnic background or race

III. Other Considerations and Constraints
  A. Funds available for production (budget)
  B. Mailing regulations and costs
  C. Available equipment for production
  D. Abilities of production personnel
  E. Size and complexities of production

IV. Summary and Conclusion

  A. Overall analysis of the job

  B. Analysis of the intended audience

  C. Other considerations and constraints

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LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

INTERACTION ITEMS:

1. What are some audience characteristics that would be helpful to know when designing a job?

2. Who is the intended audience of your school newspaper? What do you know about this audience?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Prepare to design a brochure about school accident insurance by describing:

    a. The purpose of the piece

    b. The audience for whom it is intended

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

EVALUATION ITEMS:

1. What are three major points to consider when analyzing a job for design?

   a.

   b.

   c.

2. List four characteristics of the intended audience to consider when designing a job.

   a.

   b.

   c.

   d.

3. What are five constraints to the design and production of a job?

   a.

   b.

   c.

   d.

   e.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

ANSWERS TO EVALUATION ITEMS:

1. a. Purpose or intended use
   b. Permanence required - throw away, document, archival, etc.
   c. Philosophy of client's business
      a. Client's style
      b. Nature of business

2. The student may list any four of the following:
   a. Age
   b. Education
   c. Sex
   d. Social status
   e. Economic status
   f. Special interests or occupation of audience
   g. Size of audience
   h. Ethnic background or race

3. a. Funds available for production (budget)
   b. Mailing regulations and costs
   c. Available equipment for production
   d. Abilities of production personnel
   e. Size and complexities of production

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

SCOPE OF UNIT:

The designer, working with the customer and the copywriter, is responsible for the visual impact the printed piece has on its audience. The designer must appraise this audience and create an appeal. This unit investigates the processes needed to control all aspects of this job.

INFORMATION TOPIC: II-2 OR DEMONSTRATION:

PRINCIPLES OF DESIGN
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Match design principles to correct definitions.
2. Recognize points in application of design principles.
3. Critique a printed piece provided by the instructor using the following design principles as criteria:
    a. Balance
    b. Unity
    c. Contrast
    d. Eye movement
    e. Rhythm
    f. Emphasis
    g. Harmony
4. Compare the two types of balance as applied in an example provided by the instructor and explain which should be used.
5. Make colored paper layouts that demonstrate the design principles of unity, balance, contrast, and eye movement.

6. Prepare rough sketches that illustrate the following design principles:

   a. Formal balance

   b. Informal balance

   c. Emphasis

   d. Eye movement

   e. Unity

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. TM 1: Balance

2. TM 2: Unity, Harmony

3. TM 3: Contrast, Emphasis

4. TM 4: Rhythm, Eye Movement (Direction)

5. TM 5: Sequence, Proportion

6. AS 1: Evaluating a Design

7. AS 2: Using Design Principles

8. Printed pieces for student evaluation of design principles

9. Colored paper for students designed layouts demonstrating design principles.

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 3.

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 3.

REFERENCES:

Crow, Wendell C. Communication Graphics. Englewood Cliffs, NJ: Prentice-Hall Inc., 1986, ch. 8.

INTRODUCTION:

Following a prescribed set of design principles is important to the beginner. Established design principles, although not sacred laws, are important contributions to the knowledge and technique of graphic design. Only with experience and success should the designer depart from these basics.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

INFORMATION TOPIC: II-2

OUTLINE: (Key Points)

I. Principles of Design
  A. Should be observed when developing a printed piece
  B. Have a tendency to become automatic to the designer with practice and experience
  C. Should not be treated as "non-breakable" laws, but should be regarded as guides to effective design and used as a checklist

II. Balance
  A. Elements of the design must "appear" to be balanced
    1. Left to right
    2. Top to bottom
  B. Feeling of equilibrium (may not be measurable mathematically)
  C. Should give the viewer a comfortable, "at rest" impression
  D. All elements of the design contribute to balance--including white space.
  E. Types of balance
    1. Formal balance (bisymmetric or symmetric) - each design element is centered on the page from left to right (TM 1)
    2. Informal balance (asymmetric or occult) - elements of design are not centered but are counterbalanced by varying weights and sizes along a centered or other axis to provide an overall appearance of a balanced total design (TM 1)

3. Formal and informal styles of balance should not be mixed, although areas or elements of the informal design may in themselves have formal balance.

III. Unity - overall sense that the message and design are an integrated whole and that all elements are related and state a single, unified theme (TM 2)

A. All elements of the design should appear to have relationship to each other.

B. Common points and lines of reference and common margins are important ways to achieve unity.

C. Each element should appear as though it were placed on the page for a reason. Unity is closely related to harmony.

IV. Harmony (TM 2)

A. All elements should "match" or blend well in:

1. Tone
2. Line
3. Weight
4. Shape
5. Style

B. Matching/blending of elements should be pleasing to the eye and work to form one design.

V. Contrast (TM 3)

A. Contrast means "differences."

1. Size
2. Shape
3. Tonality
4. Position of elements

B. Contrast is important to eye appeal, legibility and emphasis.

C. Attention-getting devices may be bolder, larger, brighter, blacker, etc., but displaying or emphasizing too many elements is just as ineffective as displaying none.

VI. Emphasis (TM 3)

A. Attention is placed on the most important design element or elements.

B. Emphasis is achieved by:

1. Contrast of element (size, color, tone, etc.)

2. Placement within the design

3. Use of attention-getting devices

VII. Rhythm (TM 4)

A. The sense of image flow or repetition with a purpose

B. Rhythm is achieved by:

1. A duplicated image or pattern

2. Consistency of alignment, spacing or tone

C. Rhythm is one method of achieving unity.

VIII. Eye Movement (Direction) (TM 4)

A. To gain optimum audience results from the design, the reader's eye must be tracked through the printed page.

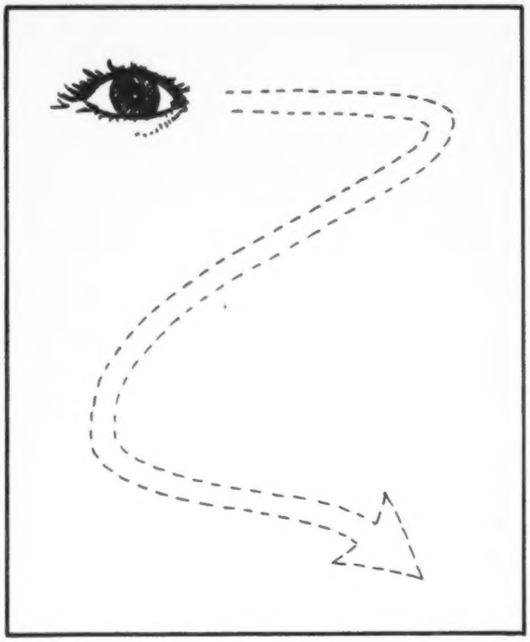
B. Some techniques used to achieve eye movement are:

1. Pointing devices - illustrations that point to other layout elements

2. Italic type - using the natural slant of type to lead the eye

3. Sequencing or arrangement of major elements along the line of eye movement

NOTE: There is considerable disagreement about how the reader's eye moves naturally through a printed page. Many believe, however, that the eye of western culture audiences travels in a "backwards S" pattern and that major design elements placed along this path will make the design most effective.



IX. Sequence - arranging or grouping of elements or illustrations of a similar size or tone along a path from top to bottom or left to right so that they are easily read as a sequence (TM 5)

X. Proportion - the contrasting or blending of shapes and sizes to assist in achieving one of the above principles (TM 5)

XI. Summary and Conclusion

- A. Principles of design
- B. Balance
- C. Unity
- D. Harmony
- E. Contrast

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F. Emphasis
G. Rhythm
H. Eye Movement
I. Sequence
J. Proportion

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

INTERACTION ITEMS:

1. What kind of businesses might use formal balance for their business designs?

2. What illustrations have direction or are natural pointing devices that might be used to assist eye movement in design?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Using strips, shapes and blocks of colored paper provided by the instructor, make layouts that demonstrate each of the following design principles. (Separate layout for each design principle.)

    a. Unity

    b. Balance

        (1) Formal

        (2) Informal

    c. Contrast

    d. Eye movement

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

EVALUATION ITEMS:

Match each design principle to the correct definition.

_____ 1. Formal balance

_____ 2. Informal balance

_____ 3. Unity

_____ 4. Harmony

_____ 5. Contrast

_____ 6. Emphasis

_____ 7. Rhythm

_____ 8. Eye movement

_____ 9. Sequence

_____10. Proportion

a. The sense of image flow or repetition with a purpose achieved by a duplicated image or pattern, or consistency of alignment, spacing, or tone

b. Arranging or grouping elements or illustrations of a similar size or tone along a path from top to bottom or left to right so that they may be continuously read in a logical way

c. Contrasting or blending of shapes and sizes to assist in achieving one of the design principles

d. All elements "match" or blend well in tone, line, weight, shape, and style to be pleasing to the eye and work to form one design

e. Elements of design are counterbalanced by varying weights and sizes along a centered or other axis to provide an overall appearance of a balanced total design

f. Each design element is centered on the page from left to right

g. Attention is placed on the most important design element or elements through use of contrast, placement within the design, or use of attention-getting devices

h. Overall sense that the message and design are an integrated whole and that all are related and state a single, unified theme

i. To secure optimum audience results from the design to be visually tracked through on the printed page; includes the use of pointing devices, italic type, or sequencing or arrangement of major elements

j. Differences in size, shape, tonality, and position of elements

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 11. The practiced and experienced designer will find that the use of correct design principles becomes automatic.

____ 12. The principles of design are meant to be followed as "non-breakable" laws.

____ 13. Formal and informal styles of balance can be mixed successfully and work well when combined.

____ 14. Unity is closely related to harmony.

____ 15. Rhythm is one method of achieving unity.

____ 16. The eye of western culture audiences tends to travel in a backwards "N" pattern.

____ 17. White space is not usually considered an important contributing element of the design.

____ 18. Use of bright color is usually ineffective for drawing out the primary goal of a design.

____ 19. It is important for all elements of a design to appear to have a relationship to one another.

____ 20. Displaying or emphasizing many attention-getting devices is more effective than displaying none.

LESSON PLAN: 2

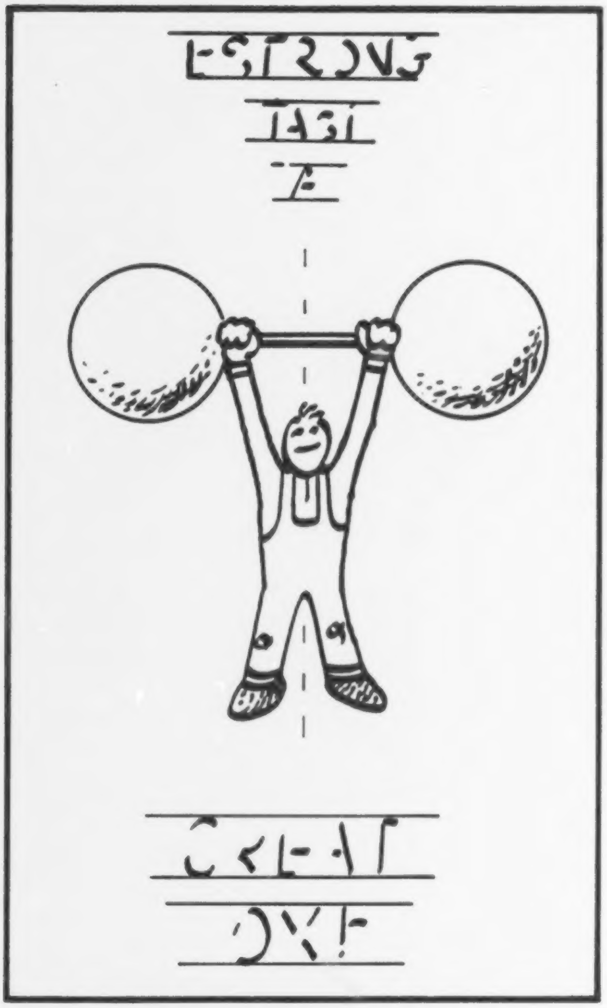
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

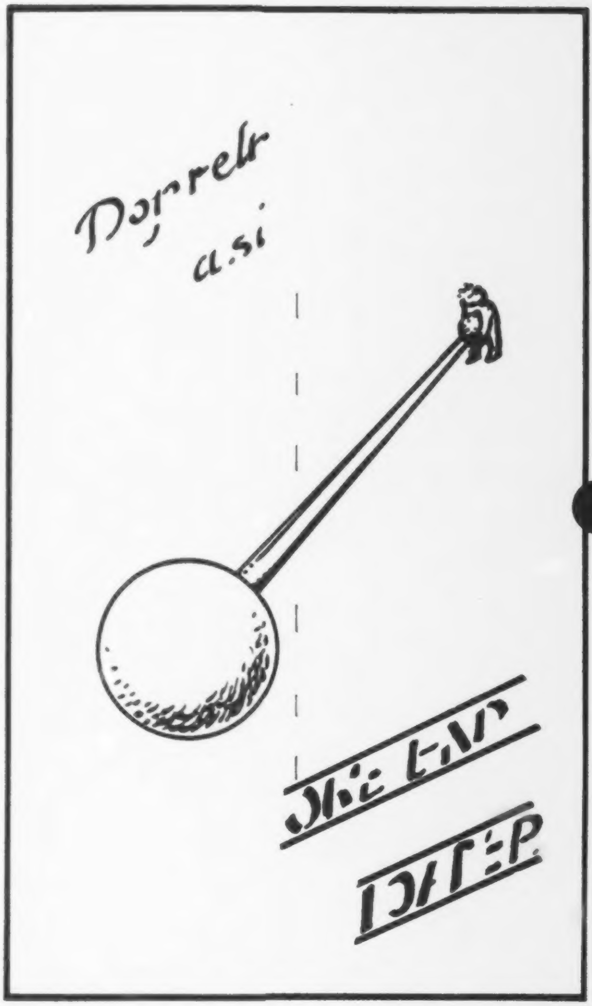
ANSWERS TO EVALUATION ITEMS:

1. f
2. e
3. h
4. d
5. j
6. g
7. a
8. i
9. b
10. c
11. T
12. F
13. F
14. T
15. T
16. F
17. F
18. F
19. T
20. F

Principles of Design
Balance

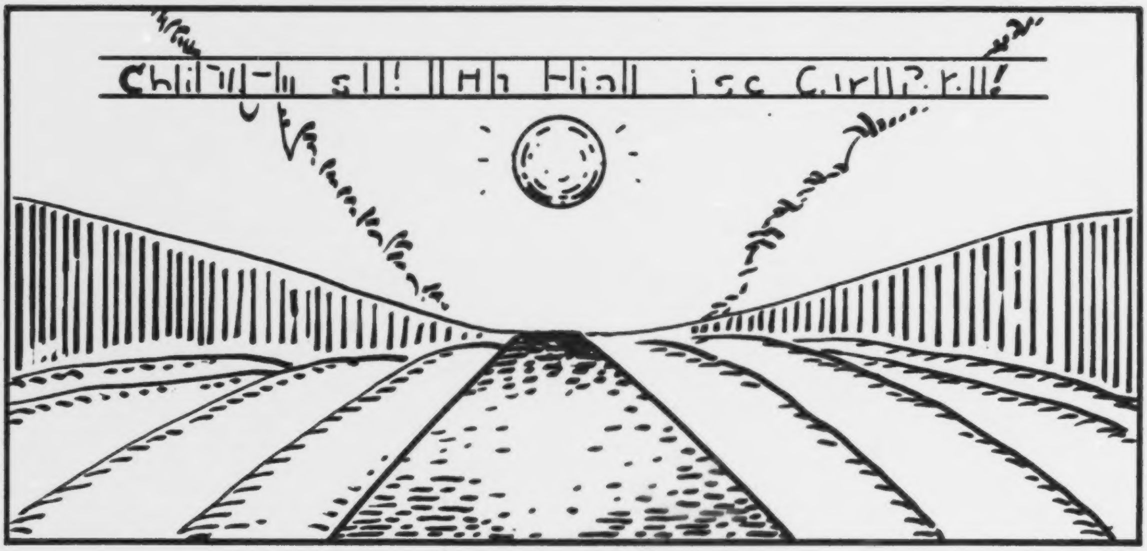


Formal Balance

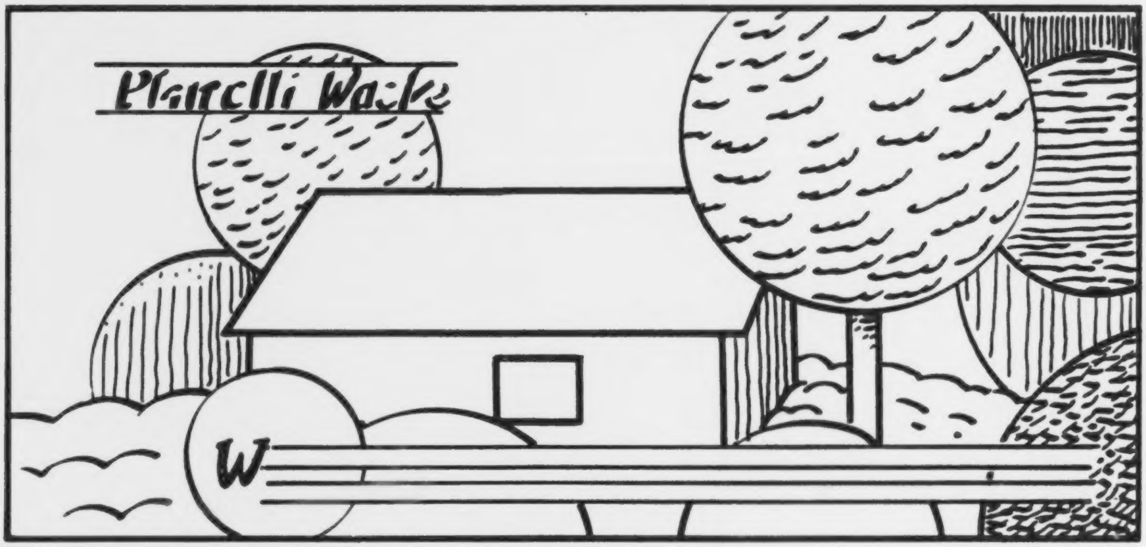


Informal Balance

Principles of Design
Unity and Harmony



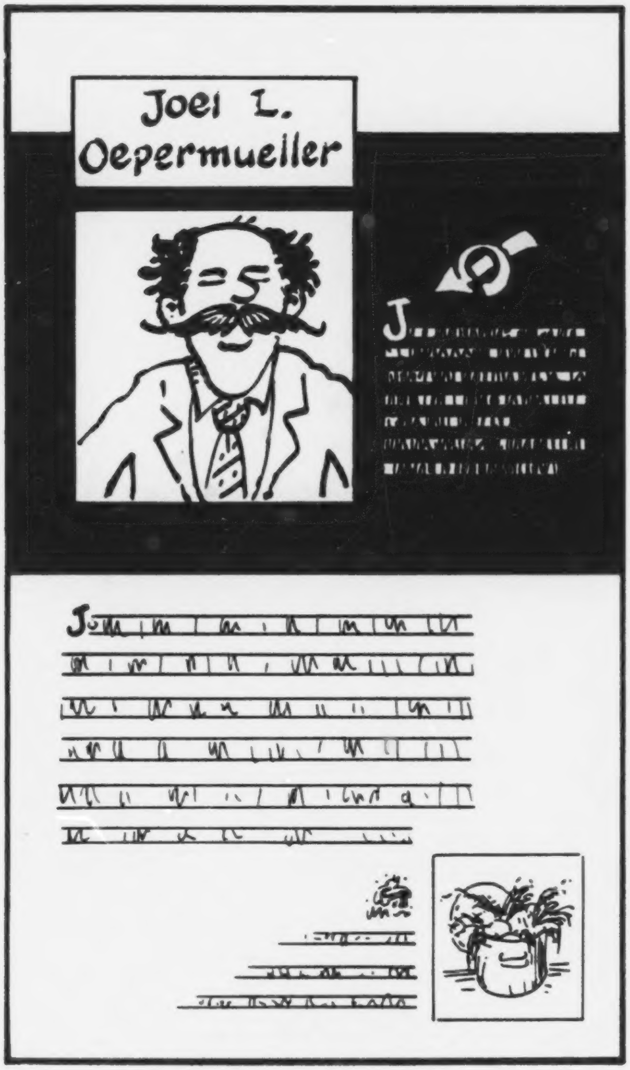
Unity



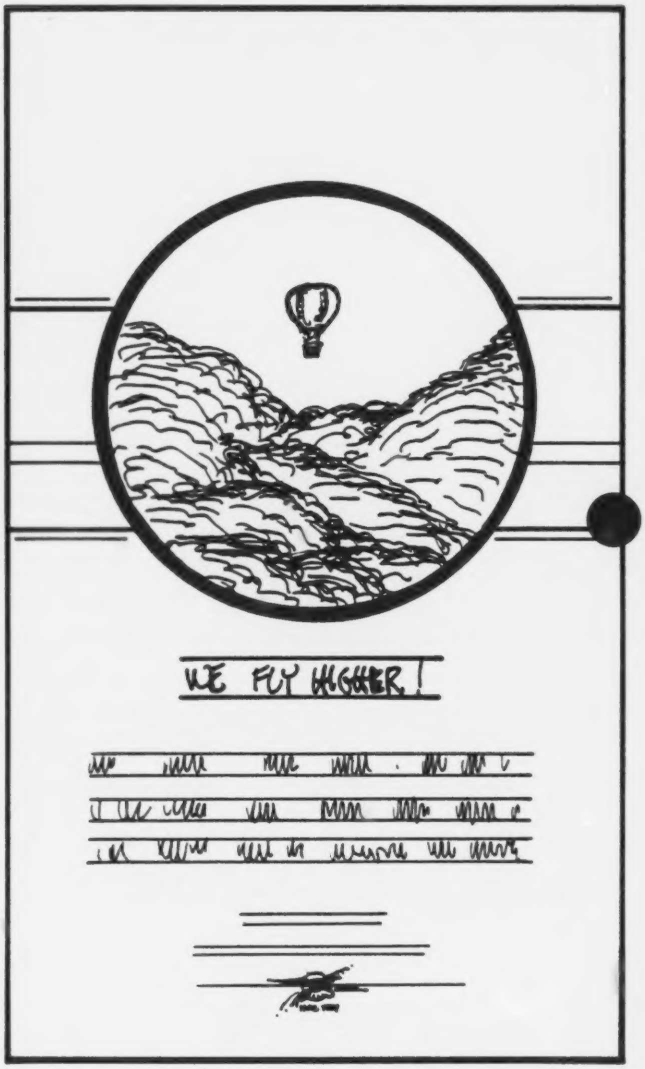
Harmony

TM 3

Principles of Design
Contrast and Emphasis


Joel L.
Oepermueller

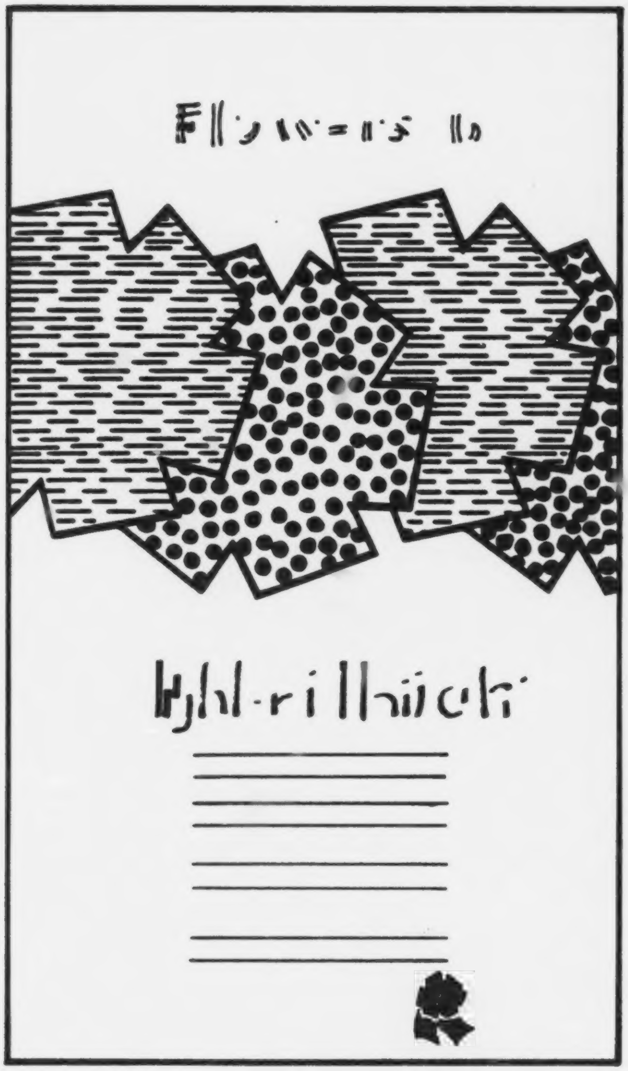
Contrast


WE FLY HIGHER!

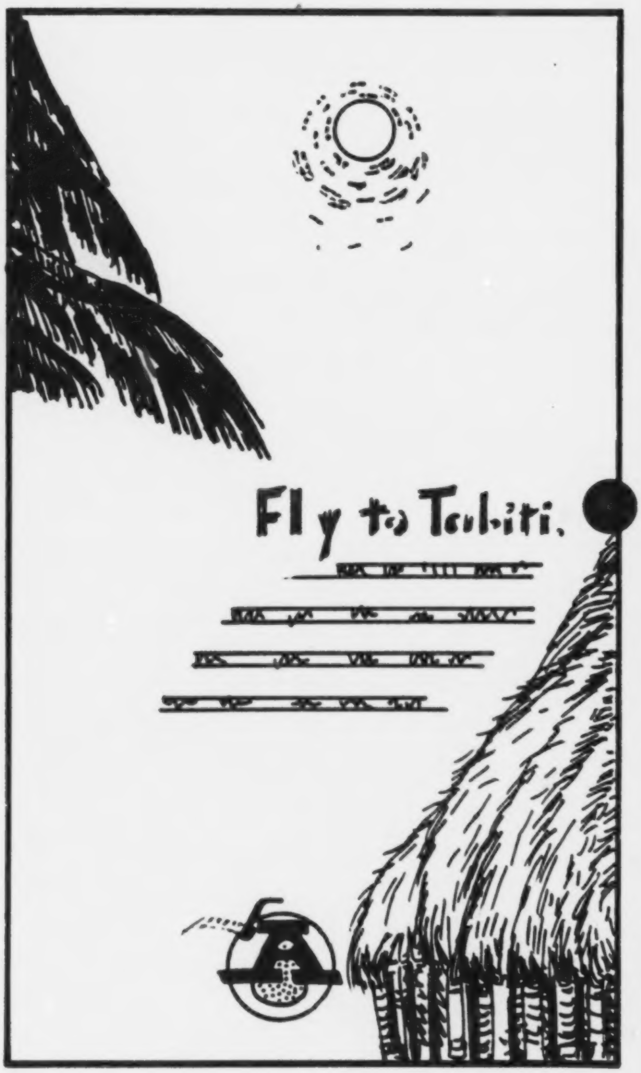
Emphasis

TM 4

Principles of Design
Rhythm and Eye Movement



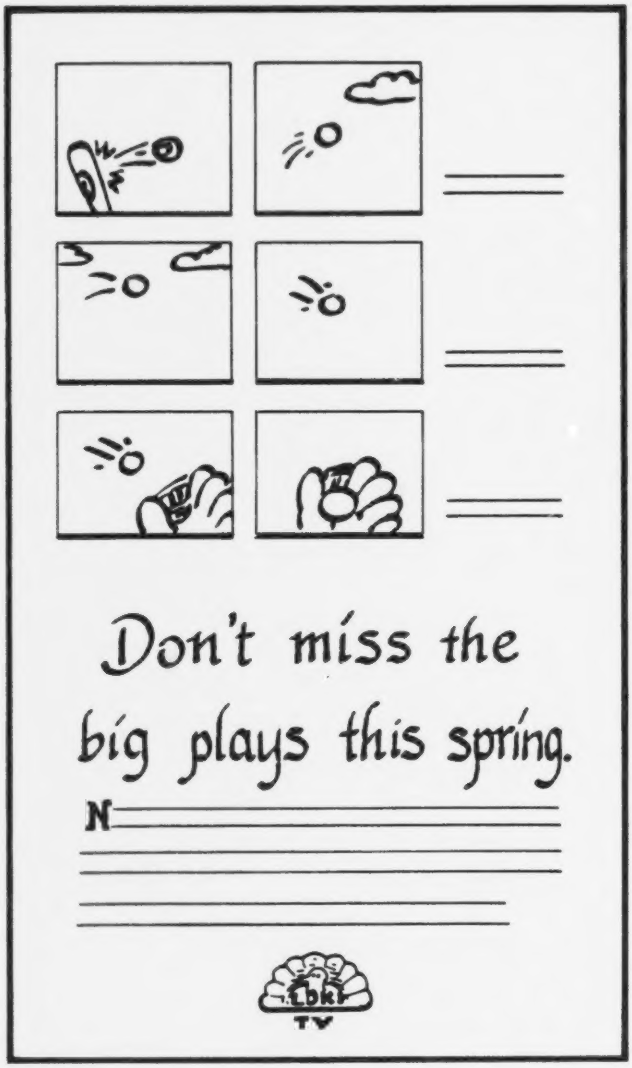
Rhythm


Fly to Tahiti.

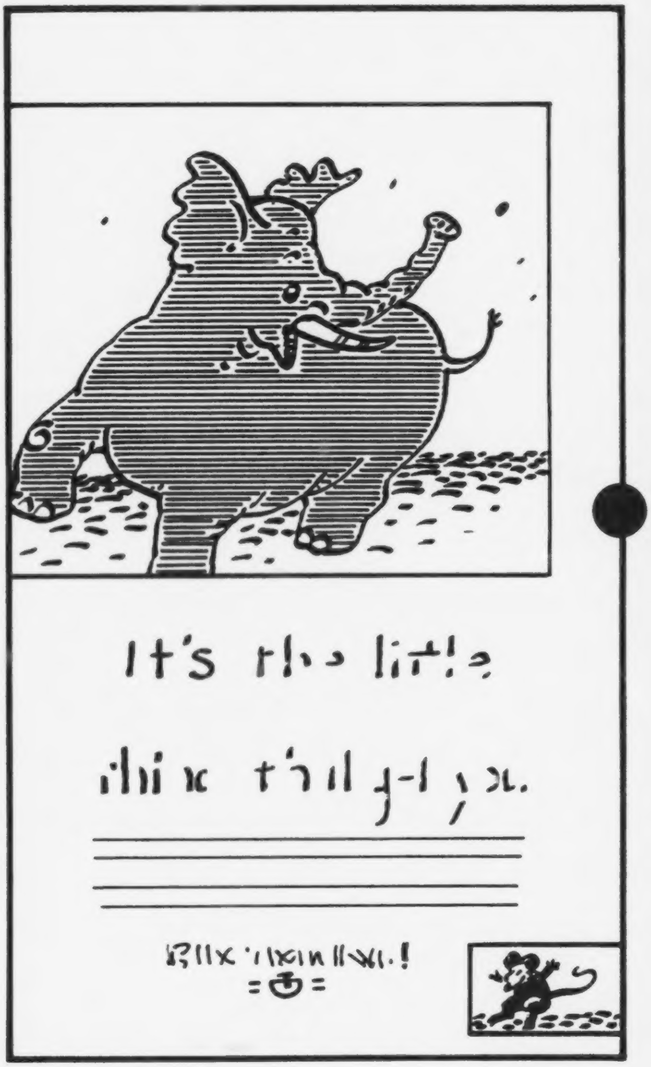
Eye Movement (Direction)

TM 5

Principles of Design
Sequence and Proportion


Don't miss the big plays this spring.
N
TV

Sequence



Proportion

ASSIGNMENT SHEET 1 - EVALUATING A DESIGN

Directions: From printed products at home, select at least three varied kinds of pieces. (Example: brochure, catalog, direct mail advertisement.) Attach a piece of notebook paper to each and answer the following questions regarding each piece.

1. What is the purpose of this printed job?

2. Who is the intended audience?

3. Was the designer successful at reaching the intended audience? (Explain why or why not.)

4. What would you change to make the piece more effective?

ASSIGNMENT SHEET 2 - USING DESIGN PRINCIPLES

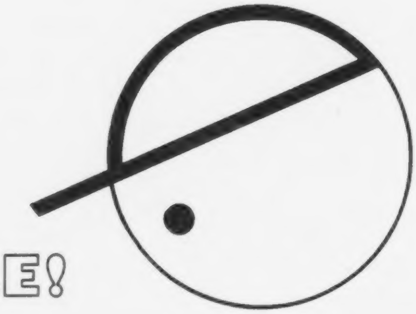
Part I

Directions: Using the colored paper provided by your instructor, make layouts that demonstrate the design principles of unity, balance, contrast, and eye movement.

Part II

Directions: Using the following copy and simple illustration, prepare simple rough sketches (4"x 6") that illustrate the following principles:

1. Formal balance
2. Informal balance
3. Emphasis
4. Eye movement
4. Unity



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6th and Vine

ANSWERS TO ASSIGNMENT SHEETS

ANSWERS TO ASSIGNMENT SHEET 1 - EVALUATING A DESIGN

This assignment sheet must be evaluated by the instructor on an individual basis for each student. Successful completion should be based on instructor satisfaction in the following areas:

1. Student should evaluate a least three varied pieces.
2. Student should determine purpose and intended audience for each piece by applying information presented in this lesson.
3. Student should evaluate the effectiveness of each piece at reaching the intended audience and explain why it is successful or unsuccessful by discussing related points presented in this lesson.
4. Student should make suggestions for improving effectiveness of the piece by utilizing concepts presented in this lesson. (Depending on the success of the design, there may be no need to change the piece.)

ANSWERS TO ASSIGNMENT SHEET 2 - USING DESIGN PRINCIPLES

Part I

The student should make four colored paper layouts that demonstrate each design principle: unity, balance, contrast, and eye movement. Evaluation criteria to be determined by the instructor, but should provide the instructor with data about the student's ability to utilize the principles of design.

Part II

The student should make a series of vertical rectangles 4"x 6" and make sketches that illustrate each listed principle. In some cases, one sketch may illustrate more than one principle. The purpose of this assignment is to train the beginning designer to think about the design principles when sketching.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

SCOPE OF UNIT:

The designer, working with the customer and the copywriter, is responsible for the visual impact the printed piece has on its audience. The designer must appraise this audience and create an appeal. This unit investigates the processes needed to control all aspects of this job.

INFORMATION TOPIC: II-3 OR DEMONSTRATION:

UNDERSTANDING TYPE STYLES
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Match terms related to type and printers' measurements to correct definitions.
2. Given a sample of type, identify the type style.
3. List three differences between old style and modern Roman types.
4. List two points to remember when using script and text types.
5. Identify two psychological characteristics to consider when selecting a typeface to represent a particular business.
6. Identify three other type characteristics (besides psychological characteristics) which must be appropriate to the job design when selecting a typeface to represent a particular business.
7. Locate and label samples of specific type styles.
8. Locate and label samples of specific type family members.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. TM 1: Type Nomenclature
2. TM 2: Printers' Measures

3. TM 3: Roman Types
4. TM 4: Sans Serif and Square Serif Types
5. TM 5: Script Types
6. TM 6: Text and Decorative Types
7. TM 7: Type Family
8. TM 8: Using Script and Text Types
9. AS 1: Identifying Type Styles

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 3.

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 2.

REFERENCES:

Conover, Theodore E. Graphic Communications Today. St. Paul, MN: West Publishing Co., 1985, ch. 3.

Crow, Wendell C. Communication Graphics. Englewood Cliffs, NJ: Prentice-Hall Inc., 1986, chs. 3, 4, 5.

INTRODUCTION:

If a printed piece has a basic goal to communicate, then the basic ingredient of an effective graphic design is type. Very little precise information can be communicated without type. It is the type's function to be expressive, create recognition, attract the reader, be easy to read, and emphasize important information. It is essential that the graphic designer learn as much as possible about type and how to use it effectively.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

OUTLINE: (Key Points)

I. Type Terms and Definitions (TM 1)

A. X-height - Height of lower-case letters without ascenders or descenders; measured in points

B. Ascender - portion of the lower-case letter (b, d, f, h, k, l) that extends above the x-height

C. Descender - portion of the lower-case letter (g, j, p, q, y) that extends below the base line

D. Base line - the imaginary line upon which all lower-case and capital letters appear to rest

E. Set size - height of type in points measured from bottom of descender to top of ascender

F. Set measure - length of line of type in picas

G. Leading (led ing) - distance between each line of type (from the bottom of the descenders of one line of type to the top of the ascenders of the following line of type); line spacing is measured in points

H. Set leading - distance from base line of one line to the base line of the following line; measured in points (set leading is the total of the set size plus the leading)

II. Printers' Measures Terms and Definitions (TM 2)

NOTE: See Unit III for more complete explanation.

A. Point - approximately 1/72 inch

B. Pica - 12 points, approximately 1/6 inch

C. Em - a variable measure of area; one em is a square of the point size

EXAMPLE: a 12-point em is a square 12 points by 12 points

III. Type Styles

   A. Roman

      1. Characterized by letters with thick and thin strokes and serifs (the line that finishes the major strokes of the letter)

      2. Named from lettering used during the Roman Empire

      3. Two types

         a. Old style Roman (TM 3) - has characteristics much as the stone-carved lettering on the Roman Coliseum

            (1) Letter divided into thirds; x-height, ascender, descender

            (2) Serifs are attached to letter by curved brackets or fillets; rounded appearance

            (3) Slight contrast between thick and thin strokes

Typography Is the Selection of a Congruous Typeface

Quality and the Suitability

Little contrast in thick and thin

Serif attached with fillet and curved

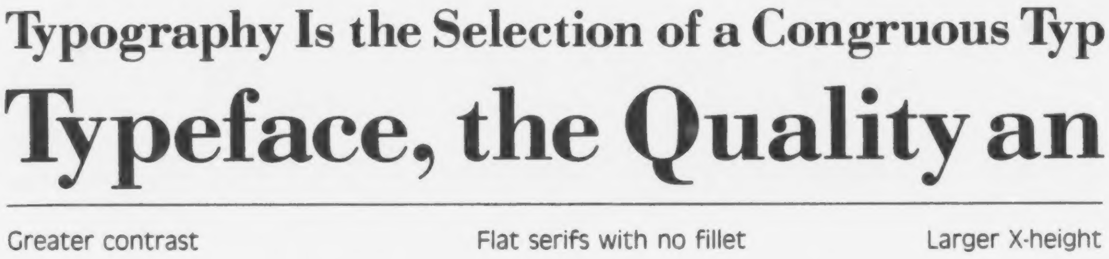
Equally divided letter height

         b. Modern Roman (TM 3) - has design characteristics of old style but much straighter and more mechanical in appearance

            (1) X-height greater than 1/3 of set size

(2) Serifs very square and mechanical with no curved brackets

(3) Greater contrast between thick and thin strokes


Typography Is the Selection of a Congruous Typ
Typeface, the Quality an
Greater contrast
Flat serifs with no fillet
Larger X-height

c. Transitional

(1) Describes type faces that take on characteristics of both old style and modern

(2) Many of the Roman types in use today fall into this category.

B. Sans serif (TM 4)

1. Sans is French for "without," therefore sans serif means "without serifs."

2. True sans serif type has a monoline stroke; i.e., all lines of the letter are equal in weight.

3. Many faces called "Gothics" are also classified as sans serif. They have a slight variance in stroke thickness.

C. Square serif (TM 4) - square serif has little or no variance in stroke thickness; sometimes called "slab serif"

D. Script (TM 5) - Both cursive and script faces are usually classified as script. Scripts are usually more formal than cursives as cursive letters do not connect.

E. Text (TM 6) - This style is sometimes classified as Old English or German black letter. These faces are generally rather easy to classify.

F. Decorative (TM 6) - Hand lettered shapes and designs that don't fit the criteria of other styles can be classified as decorative. These are sometimes classified as miscellaneous or novelty types.

IV. Selecting and Using Type

A. The ability to select one typeface over another is what separates the skilled user from the novice. One must have a feeling for and understand the importance of appropriate type characteristics to the job design such as:

1. Psychological characteristics of type
    a. Personality
    b. Mood
    c. Feeling or tone
    d. Atmosphere
    e. Congeniality
2. Design characteristics of type
    a. Type size - too large or too small
    b. Type weight - too light or too bold
    c. Type posture - too erect or too slanted
3. Similarity of type to that used in competitive messages
4. Compatibility of type with corporate symbols, logos, trademarks, etc.

B. Select a few (2 or 3) faces for use with a design, then use variations of the type family for variety. (TM 7)

1. Bold
2. Light

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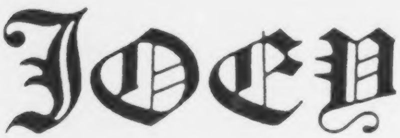
   3. Italic
   4. Extended
   5. Condensed
   6. Outline
   7. Shadow

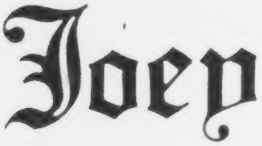
C. Mix faces from similar styles.

D. Achieve variety by varying size, posture, and contrast of any type family within the design. (TM 7)

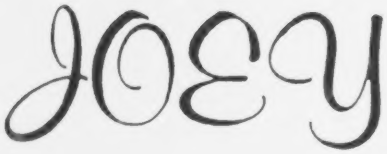
E. Never use script or text styles in all caps. These types are representative of hand lettering or writing and as such are not legible in all caps.



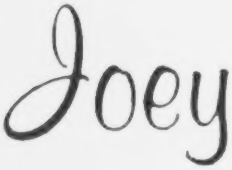
Text (Manuscript Gothic) Set in All Caps



Text (Manuscript Gothic) Set in Caps and Lower-Case



Script (Murray Hill) Set in All Caps



Script (Murray Hill) Set in Caps and Lower-Case

F. Use decorative, text, or script sparingly--for one word or line--for emphasis or contrast. (TM 8)

G. Most decorative styles take on some of the characteristics of one of the other styles, but do not fit strictly into that category. Such types may be used and mixed the same as the pure style.

V. Summary and Conclusion

- A. Type terms and definitions
- B. Printers' measures terms and definitions
- C. Type styles
- D. Selecting and using type

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

INTERACTION ITEMS:

1. Why should we use unusual type such as script, text and some decorative styles only for emphasis lines?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Instructor provides a list of businesses with brief descriptions of goods and services associated with each company or business. Students break into groups of four or five, and each group selects a business. Looking at a type specimen catalog, each group then selects the one type that best expresses the personality and function of the business they chose. Groups will take turns explaining why they chose a particular type design and what characteristics of the type seem to reflect the characteristics or personality of the company.

2. Students study trademarks and identify symbols (logos) of companies and discuss why they think a particular design or style was chosen to represent that company.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

EVALUATION ITEMS:

Match the following terms to correct definitions.

_____ 1. X-height

_____ 2. Ascender

_____ 3. Descender

_____ 4. Base line

_____ 5. Set size

_____ 6. Set measure

_____ 7. Leading

_____ 8. Set leading

_____ 9. Point

_____10. Pica

_____11. Em

a. Height of type measured from bottom of descender to top of ascender

b. Distance from base line of one line of type to the base line of the following line of type

c. Portion of the lower-case letter that extends below the base line

d. A variable measure of area; a square of the point size

e. Length of line of type in picas

f. Height of lower-case letters without ascenders or descenders

g. Approximately 1/72 inch

h. Portion of the lower-case letters that extends above the x-height

i. The imaginary line upon which all lower-case and capital letters appear to rest

j. Approximately 1/6 inch

k. Distance between each line of type (from the bottom of the descenders of one line of type to the top of the ascenders of the following line of type)

12. List three differences between old style and modern Roman types.

    a.

    b.

    c.

13. List two points to remember when using script and text types.

    a.

    b.

14. List two psychological characteristics of type to consider when selecting a type face to represent a particular business.

    a.

    b.

15. List three other type characteristics (besides psychological characteristics) which must be appropriate to the job design when selecting a type face to represent a particular business.

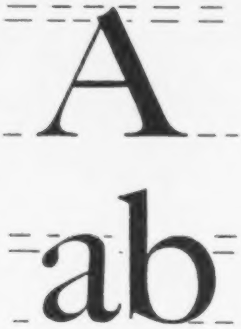
    a.

    b.

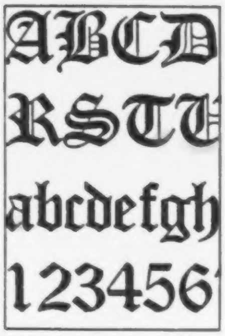
    c.

16. Identify the type style each of the following type samples represent:

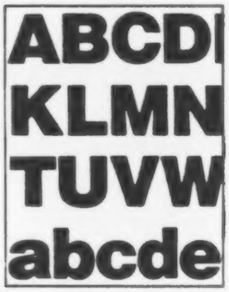
a.



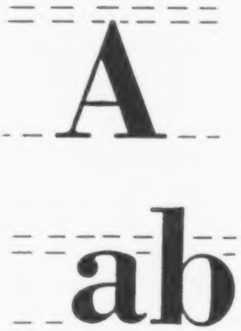
b.


ABCD
RSTU
abcdefgh
123456

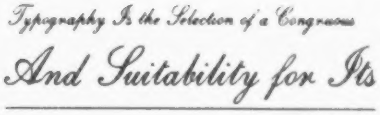
c.


ABCD
KLMN
TUVW
abcde

d.

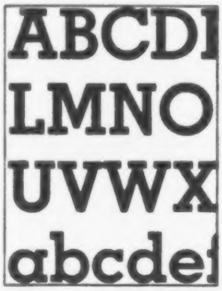


e.



Typography Is the Selection of a Congruous
And Suitability for Its

f.


ABCD
LMNO
UVWX
abcde

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

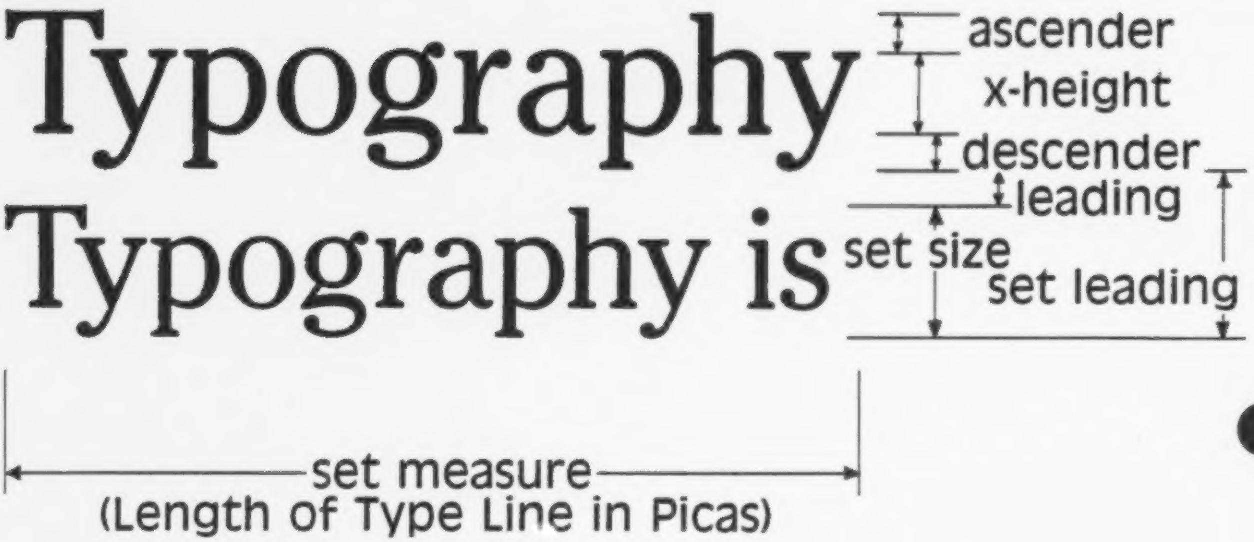
UNIT II : PREPARING CUSTOMER LAYOUTS

ANSWERS TO EVALUATION ITEMS:

1. f
2. h
3. c
4. i
5. a
6. e
7. k
8. b
9. g
10. j
11. d
12. a. X-height (larger on modern)
    b. Serifs (straighter and more mechanical looking on modern)
    c. Thick/thin strokes (more contrasting on modern)
13. a. Never use script or text styles in all caps
    b. Use sparingly--for emphasis or contrast
14. The student may list any two of the following:
    a. Personality
    b. Mood
    c. Feeling or tone
    d. Atmosphere
    e. Congeniality
15. a. Design characteristics
    b. Similarity of type to that used in competitive messages
    c. Compatibility of type with corporate symbols, logos, trademarks, etc.
16. a. Roman old style
    b. Text
    c. Sans serif
    d. Roman modern
    e. Script
    f. Square serif

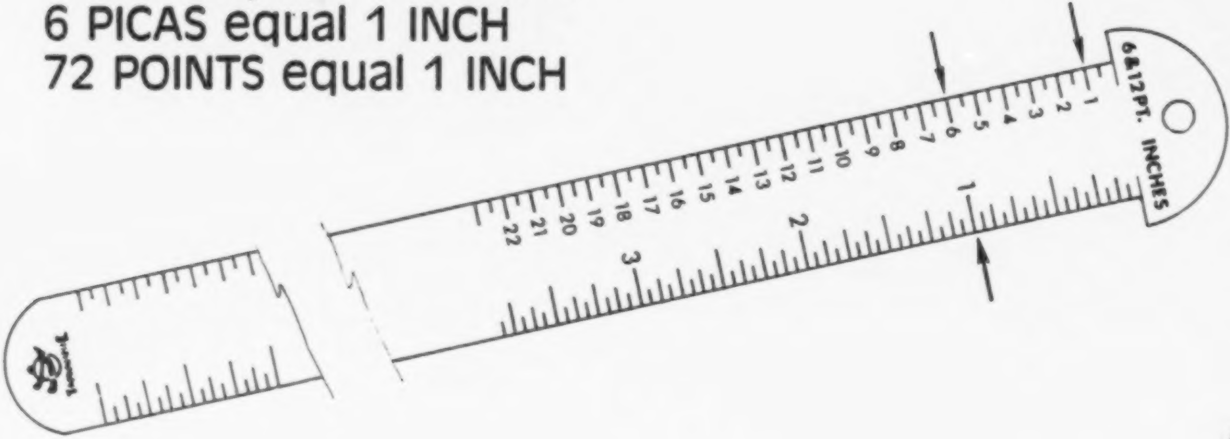
TM 1

Type Nomenclature

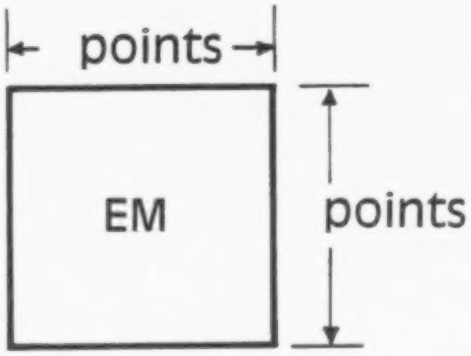

Typography
Typography is
ascender
x-height
descender
leading
set size
set leading
set measure
(Length of Type Line in Picas)

Printers' Measures

1 PICA equals 12 POINTS
6 PICAS equal 1 INCH
72 POINTS equal 1 INCH


6&12PT. INCHES
1
2
3

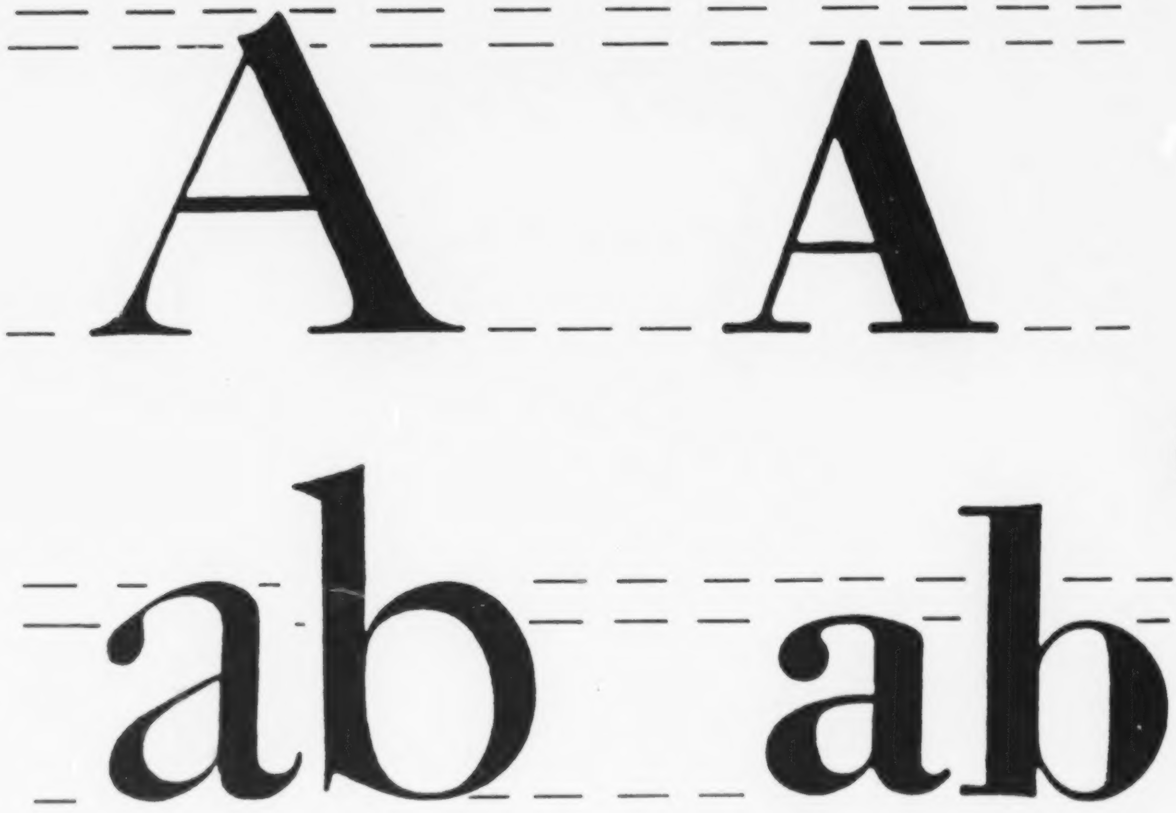
Relationship of points, picas, and inches


points
EM
points

EM equals the square of the point size

TM 3

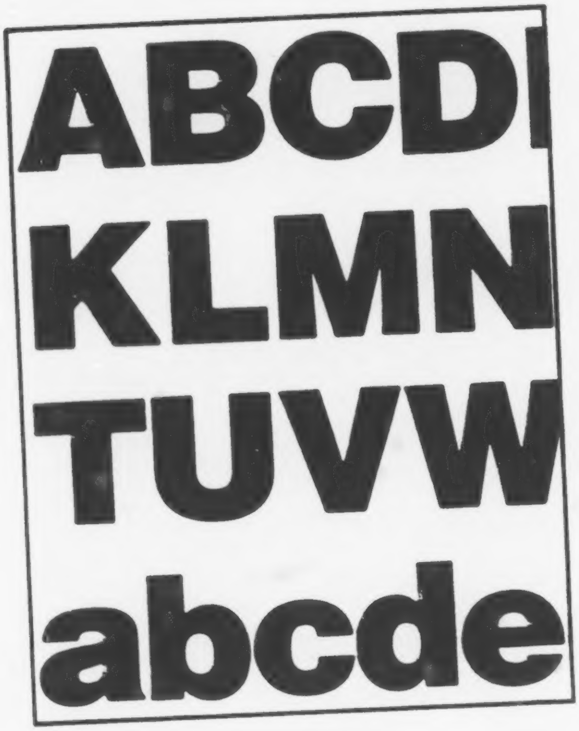
Roman Types



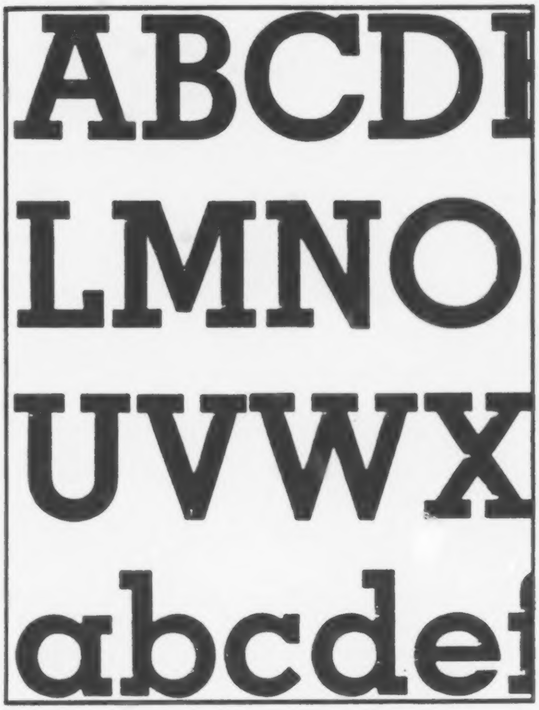
Old Style

Modern Type

Sans Serif and Square Serif Types


ABCD
KLMN
TUVW
abcde

Sans Serif


ABCD
LMNO
UVWX
abcde

Square Serif

TM 5

Script Types

Typography Is the Selection of a Congruous

Quality and Suitability

Cursive

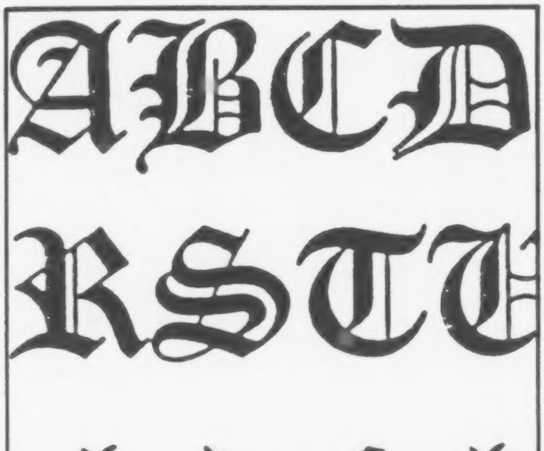
Typography Is the Selection of a Congruous

And Suitability for Its

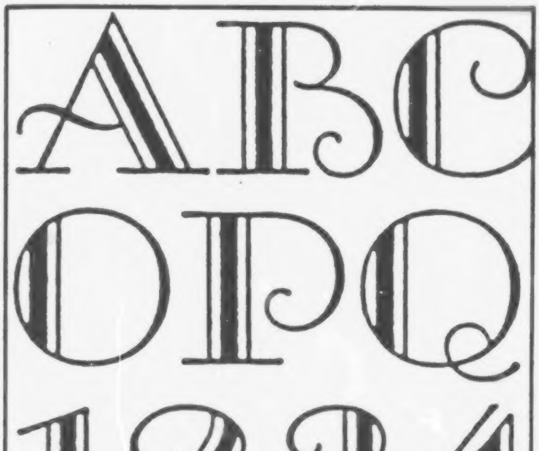
Script

TM 6

Text and Decorative Types


ABCD
RSTU
abcdefgh
123456

Text


ABC
OPQ
1234
AE

Decorative

TM 7

Type Family

Garamond Light
Garamond Book
Garamond Bold
Garamond Ultra
Garamond Light Italic
Garamond Book Italic
Garamond Bold Italic
Garamond Ultra Italic
Garamond Light Condensed
Garamond Book Condensed
Garamond Bold Condensed
Garamond Ultra Condensed
Garamond Light Condensed Italic
Garamond Book Condensed Italic
Garamond Bold Condensed Italic
Garamond Ultra Condensed Italic

TM 8

Using Script and Text Types

- Never use script or text styles in all caps. These types are representative of hand lettering or writing and as such are not as legible in all caps.
- Use these styles sparingly--for one word or line--for emphasis or contrast.
- Mix faces from similar styles.
- Use decorative text or script sparingly for one word or line for emphasis or contrast.
- Achieve variety by varying size, posture, and contrast of any type family within the design.
- Never use script or text styles in all caps. These types are representative of hand lettering and are not as legible in all caps as most typefaces.

JOEY	Text (Manuscript Gothic) set in all caps
Joey	Text (Manuscript Gothic) set in caps and lower case
JOEY	Script (Murray Hill) set in all caps
Joey	Script (Murray Hill) set in caps and lower case

ASSIGNMENT SHEET 1 - IDENTIFYING TYPE STYLES

PART I

Directions: Using old magazines or newspapers from home, clip at least two display size examples of each of the following type styles. Neatly paste them on a piece of 8½"x 11" colored paper and neatly label them.

1. Modern
2. Old style
3. Sans Serif
4. Square Serif
5. Script
6. Text
7. Decorative

PART II

Directions: Clip at least one display size example of each of the following type family members. Attach them to another colored sheet and label.

1. Bold face
2. Light face
3. Ultra bold
4. Italic
5. Extended
6. Condensed
7. Outline
8. Shadow

ANSWERS TO ASSIGNMENT SHEET

ASSIGNMENT SHEET 1 - IDENTIFYING TYPE STYLES

Satisfactory completion of this assignment sheet will be based on the following, in addition to the instructor's criteria:

1. Two display examples of each type style (total of 14).
2. One example each of type family members (total of 8).
3. Neatness and accuracy of labeling.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

SCOPE OF UNIT:

The designer, working with the customer and the copywriter, is responsible for the visual impact the printed piece has on its audience. The designer must appraise this audience and create an appeal. This unit investigates the processes needed to control all aspects of this job.

INFORMATION TOPIC: II-4 OR DEMONSTRATION:

MAKING THE LAYOUT
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify the steps in layout production.
2. List four design specifications that may be included on the dummy.
3. Make a set of thumbnail sketches.
4. Make a rough layout.
5. Make a comprehensive layout.
6. Make a dummy.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. TM 1: Thumbnail Sketches
2. TM 2: Rough Layout
3. TM 3: Comprehensive Layout
4. AS 1: Making the Layout

5. Video Tape GA-88-120: Preparing Customer Layouts. Available from The Media Center, State Fair Community College, 1900 Clarendon Rd., Sedalia, MO 65301 (816)826-7100

6. Examples of layouts, dummys and finished jobs for which the layouts were used (to be furnished by the instructor)

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 3.

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 3.

REFERENCES:

Conover, Theodore E. Graphic Communications Today. St. Paul, MN: West Publishing Co., 1985, ch. 9.

Crow, Wendell C. Communication Graphics. Englewood Cliffs, NJ: Prentice-Hall Inc., 1986, chs. 3-5.

INTRODUCTION:

A precise method of developing an acceptable graphic design should be practiced. Only through a number of trials (thumbnails) can the designer be assured of the best, most effective design.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

OUTLINE: (Key Points)

I. Steps in Layout Production
  A. Thumbnail sketches
  B. Rough layout
  C. Comprehensive layout
  D. Dummy

II. Thumbnail Sketches ("Thumbnails") (TM 1)
  A. Small - typically 1/4 the size of product
  B. In proportion
  C. Quick visual idea
  D. Pencil sketch
  E. At least four, but as many as necessary to assure exhaustion of all ideas
  F. Select the "best" to refine

III. Rough Layout ("Rough") (TM 2)
  A. Refine and develop the "best" thumbnail
  B. Made actual size (usually)
  C. Made actual shape in proportion
  D. Generally one color and in pencil
  E. Display type drawn neatly
  F. Illustrations represented to size, shape and mood
  G. If not satisfied with rough, go back to "step A" and repeat the process.

IV. Comprehensive Layout ("Comp") (TM 3)

A. Final layout

B. Actual size, shape, color

C. Everything as close as possible to desired appearance of final project

D. The comprehensive is the layout the client examines for approval. It is a prototype, a one of a kind handmade product that will be used as a guide to make the production run. It must be neat!

V. Dummy

A. The dummy is basically the comprehensive layout with the addition of design specifications.

B. It is the printer's production guide, the "blueprint" or plan.

C. Includes design specifications such as:

1. Color
2. Typeface
3. Type size
4. Paper type (stock)
    a. Color
    b. Weight
    c. Size
    d. Finish
5. Folding
6. Die cutting and trimming
7. Embossing

VI. Summary and Conclusion

A. Steps in layout production

B. Thumbnail sketches

C. Rough layout

D. Comprehensive layout

E. Dummy

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

INTERACTION ITEMS:

1. Why does the designer make a number of preliminary sketches (thumbnails) instead of making the final, finished layout in the first place?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Make at least four thumbnail sketches of a business card. (Note to instructor: You should furnish copy for this first attempt so that the entire series of sketches will be of one card, not one sketch each of four different cards. Encourage the students to experiment with both vertical and horizontal formats using formal and informal balance techniques. Typical business card size is 2" x 3 1/2".)

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

EVALUATION ITEMS:

For each of the following statements or questions, write the letter of the correct response in the blank provided.

____ 1. The first step in making a layout is to draw a number of quick, "visual ideas" on paper. This is called the:

a. Dummy
b. Rough layout
c. Thumbnail sketch
d. Comprehensive layout
e. Paste-up

____ 2. The comprehensive layout differs from the dummy in that:

a. There are several comprehensive layouts, but only one dummy.
b. The dummy includes written design specifications not used on the comprehensive.
c. The comprehensive is a very quick sketch, the dummy is very neat.
d. There is no difference between the comprehensive and the dummy.

____ 3. The step(s) of the layout procedure that should be drawn in proportion to the finished printed piece is (are) the:

a. Rough layout
b. Dummy
c. Thumbnail sketch
d. Comprehensive layout
e. All of the above

____ 4. Which stage of layout would you normally show to the client (customer)?

a. Dummy
b. Comprehensive layout
c. Rough layout
d. Thumbnail sketch
e. None of the above

5. List at least four design specifications which the designer might include on the dummy.

   a.

   b.

   c.

   d.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

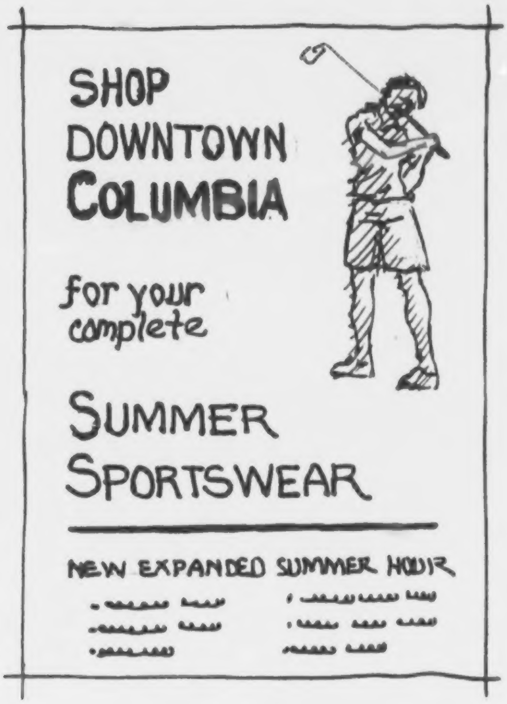
UNIT II : PREPARING CUSTOMER LAYOUTS

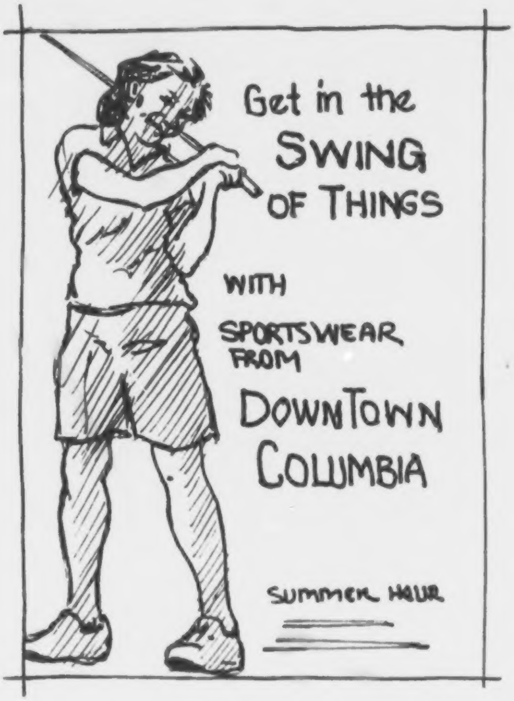
ANSWERS TO EVALUATION ITEMS:

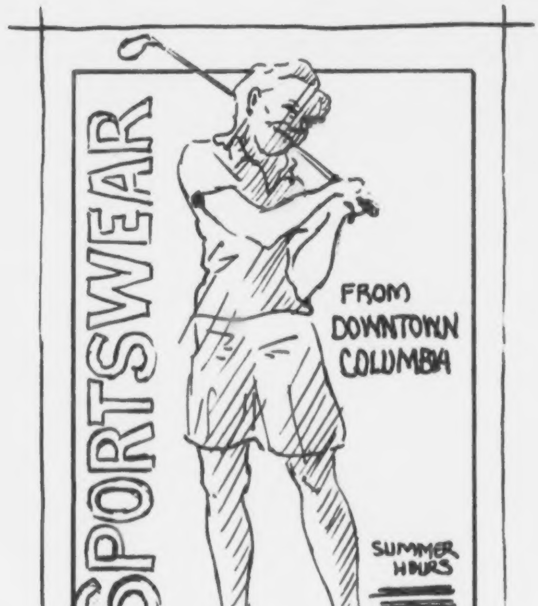
1. c
2. b
3. e
4. b
5. The student may list any four of the following:
   a. Color
   b. Type face
   c. Type size
   d. Paper type (Stock)
      1. Color
      2. Weight
      3. Size
      4. Finish
   e. Folding
   f. Die cutting and trimming
   g. Embossing

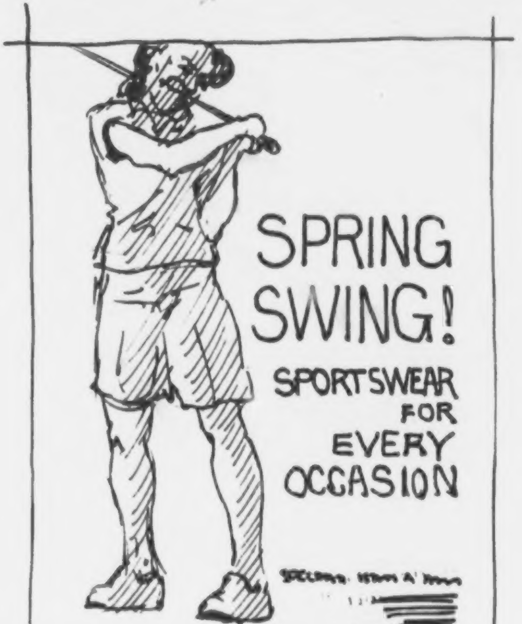
TM 1

Thumbnail Sketches


SHOP
DOWNTOWN
COLUMBIA
for your complete
SUMMER
SPORTSWEAR
NEW EXPANDED SUMMER HOUR

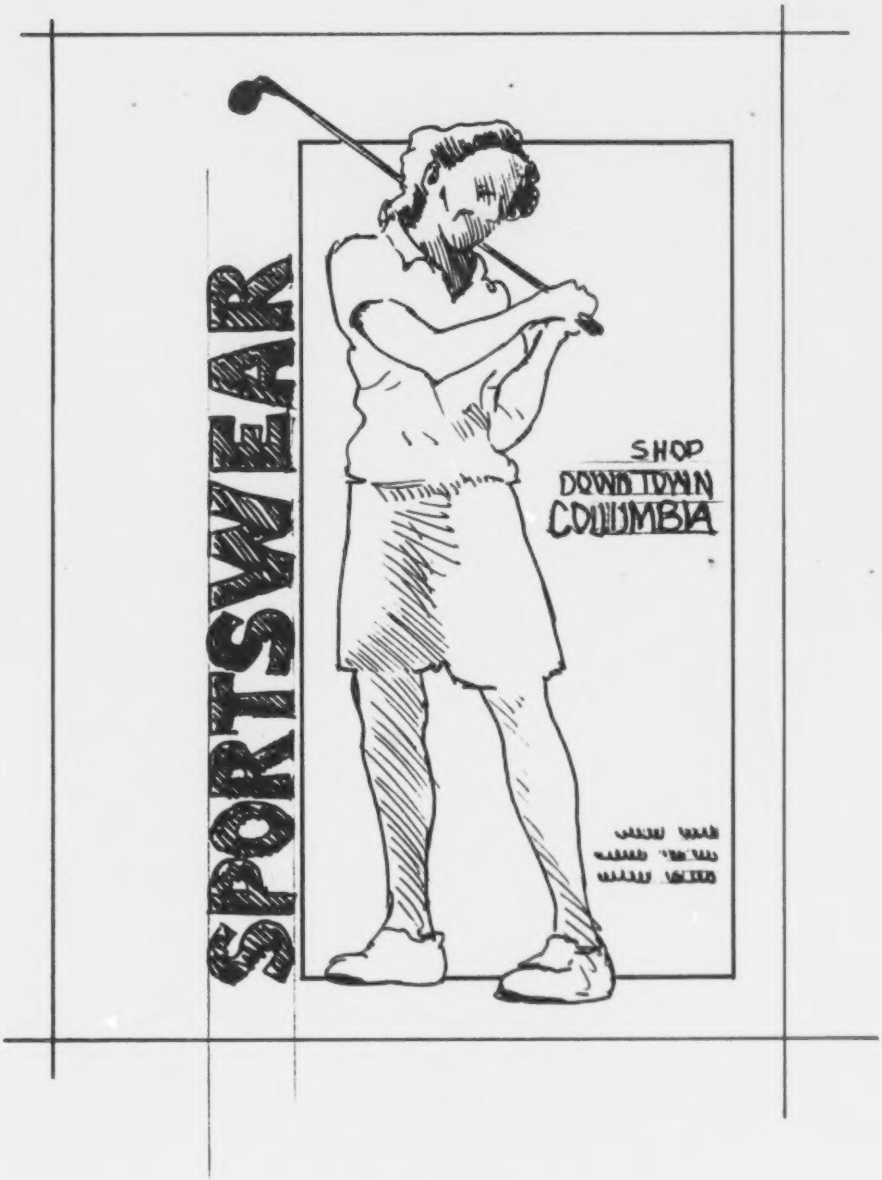

Get in the
SWING
OF THINGS
WITH
SPORTSWEAR
FROM
DOWNTOWN
COLUMBIA
SUMMER HOUR


SPORTSWEAR
FROM
DOWNTOWN
COLUMBIA
SUMMER
HOURS


SPRING
SWING!
SPORTSWEAR
FOR
EVERY
OCCASION
SHOP DOWNTOWN COLUMBIA, MD

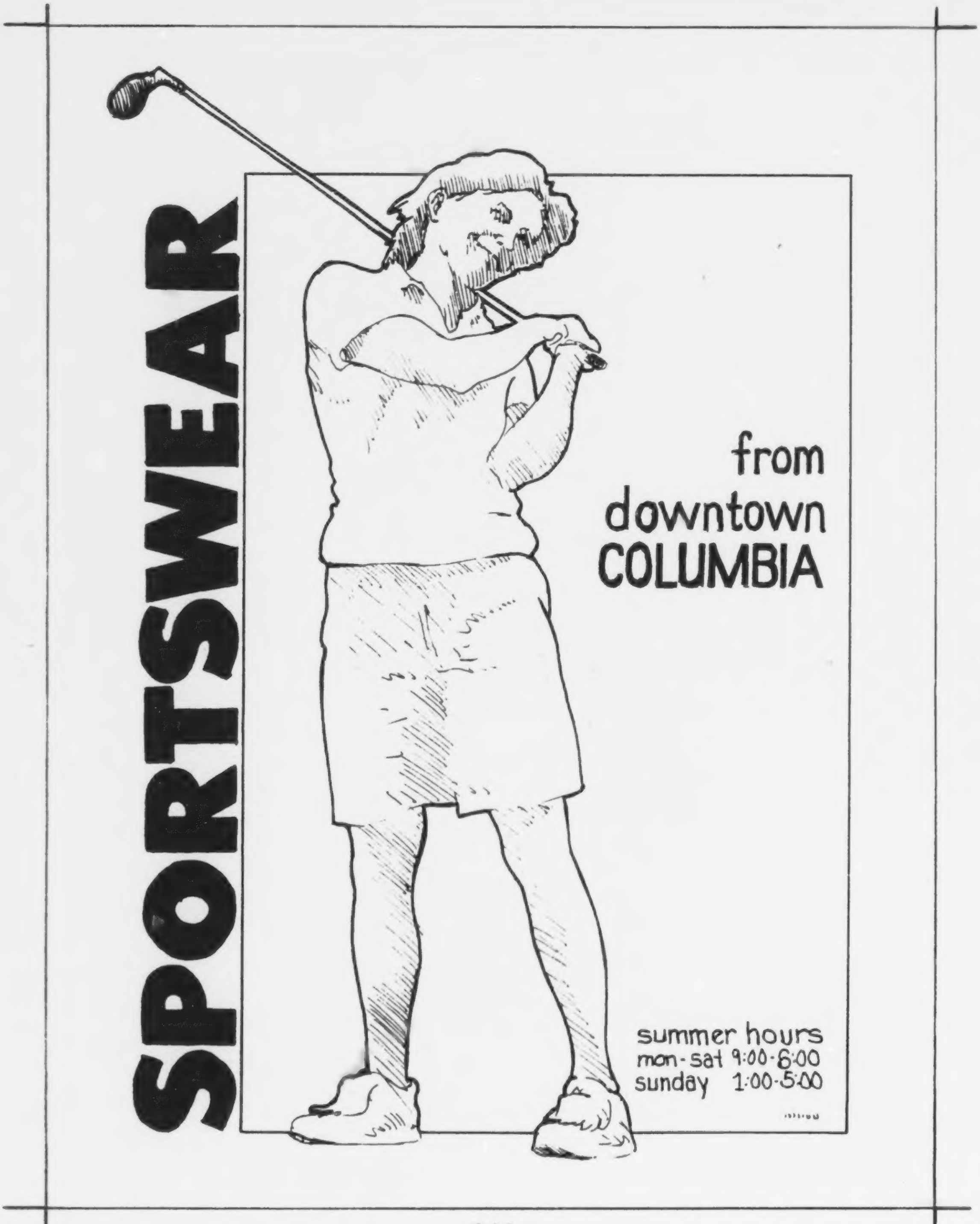
TM 2

Rough Layout


SPORTSWEAR
SHOP
DOWNTOWN
COLUMBIA

TM 3

Comprehensive Layout


SPORTSWEAR
from
downtown
COLUMBIA
summer hours
mon-sat 9:00-6:00
sunday 1:00-5:00

AS 1

ASSIGNMENT SHEET 1 - MAKING THE LAYOUT

Directions: Select the best of the thumbnail sketches you produced in class. Ask your teacher's opinion.

Part I

Make a neat, rough layout of your best design. Use pencil but make it accurate in size and shape. If you find that the type and illustration don't fit as you expected from the thumbnail sketch, or that it just doesn't look right, try again. It is much better to spend extra time at this stage of planning than to redo production steps later.

When the rough layout has achieved the desired effect (when it looks good) have your teacher approve it.

Part II

Make the comprehensive layout. This layout should be the exact size, color, and style of the finished job. Use the actual paper on which the job will be printed. Be willing to spend extra time on this aspect of planning in order to make the layout look as close to the printed piece as possible.

Your teacher is your customer. After this comprehensive layout (comp) is completed, have your teacher examine and comment on it. If it needs to be modified or redone, do so before moving on to the next step.

Part III

Mount your comprehensive layout on a piece of contrasting paper. If your layout is on white paper, mount it on a colored stock; if on colored paper, mount it on a white stock. On this background sheet, list all of the printing specifications the printer will need to know for printing the job. This comprehensive layout with specifications added is called the dummy.

ANSWERS TO ASSIGNMENT SHEET

ASSIGNMENT SHEET 1: MAKING THE LAYOUT

Students should complete parts I, II, and III as steps and secure the instructor's approval before continuing to the next part. Satisfactory completion of this assignment will be determined by the instructor's criteria.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

SCOPE OF UNIT:

The designer, working with the customer and the copywriter, is responsible for the visual impact the printed piece has on its audience. The designer must appraise this audience and create an appeal. This unit investigates the processes needed to control all aspects of this job.

INFORMATION TOPIC: II-5 OR DEMONSTRATION:

COPYFITTING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. List four elements to include in type markup.
2. Identify five type markup symbols.
3. Identify basic points to understanding copyfitting.
4. Determine how much space a line of display type will occupy.
5. Determine the amount of space a given amount of copy will occupy when set in type.
6. Determine how much copy must be written to fill a given amount of space.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Copyfitting Headlines or Display Type by the Unit-Count Method
2. HO 2: Copyfitting by the Character-Count Method
4. AS 1: Copyfitting
5. Video Tape GA-88-130: Copyfitting. Available from The Media Center, State Fair Community College, 1900 Clarendon Rd., Sedalia, MO 65301 (816)826-7100

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. *Comprehensive Graphic Arts*. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, unit 25.

HO 1: Copyfitting Headlines or Display Type by the Unit Count Method

HO 2: Copyfitting by the Character-Count Method

REFERENCES:

Conover, Theodore E. *Graphic Communications Today*. St. Paul, MN: West Publishing Co., 1985, ch. 10.

Crow, Wendell C. *Communication Graphics*. Englewood Cliffs, NJ: Prentice-Hall Inc., 1986, ch. 5.

INTRODUCTION:

Although modern, computerized typesetting equipment makes copyfitting less important to the typesetter, it is as important as ever to the graphic designer. The first task most beginning graphic designers are assigned is to fit copy for more experienced, senior designers. The designer can take existing copy and determine the amount of space it will occupy given the type parameters of size, space, line length, etc. The designer can also use it as a tool to instruct a copy writer in how much copy should be written to fill a given space with type. Without copyfitting, the type may have to be set several times to make it fit in the allotted space. This would be time consuming and costly.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

OUTLINE: (Key Points)

I. Type Markup

NOTE: See Unit III for a more complete explanation.

A. Type markup should include:

1. Family, family member, and size of all type faces

2. The lengths of all lines plus the leading between each line

3. The line setting such as flush left, flush right or centered, (unmarked lines are assumed to be justified)

4. Any special instructions (caps, lower case, etc.)

B. Some generally accepted markup symbols

1. BF or bld - bold face

2. Lt - light face

3. Bk - book face

4. Demi - demi bold

5. Ultra - ultra bold, extra bold, etc.

6. Con - condensed

7. Ext - extended

8. Ital - italic, oblique

9. BS - backslant

10. Cps, Caps - set in all caps

11. Clc - set in caps and lower-case

12. lc - set in lower-case

13. Pt - points

14.]∼∼∼[or ctr - center line

15. ∼∼∼[or fl - flush left

16.]∼∼∼ or fr - flush right

C. Some markup examples

1. 8/10 - 22 Bodoni bld ital

    a. 8 - set size in points

    b. 10 - set leading in points

    c. 22 - line length in picas

    d. Bodoni - family

    e. Bld - member

    f. Ital - member

    g. The above markup would be read "eight on ten, twenty-two Bodoni bold italic." Type set as such would be justified.

2. 18/18 - 24 Lydian cursive, ctr.

3. Headline or display type markups often do not include set leading, which to the designer is of little importance. Line length marked on a centered or flush line is marked as a maximum length only.

4. Details of other markup notations may be found in Unit III.

II. Understanding Copyfitting

A. Most copyfitting methods are based on averages so that the result is really an estimate, not an exact number.

B. Because copy may have an excessive number of short words (more spaces), many words with m's or w's, or many words with thin letters such as i's, l's, etc., it becomes impossible to determine an exact character per pica (cpp) count.

C. When large quantities of copy are being worked with, the above listed abnormalities will tend to average out.

III. Copyfitting Headlines or Display Type by the Unit-Count Method (HO 1)

   A. Traditional method of unit-count which works fairly well for standing heads, column heads, captions, etc. which recur in style such as in books, newspapers and other publications

   B. It has become much less important today with modern electronic/photographic typesetting; is basically valueless with digital-electronic equipment which is able to expand and condense type to fit the required space

IV. Copyfitting by the Character-Count Method (HO 2)

   A. The character-count method of copyfitting body copy can be very accurate.

   B. Based on an averaging method and, as such, is more accurate for large quantities of copy; not suitable for a line or two

V. Summary and Conclusion

   A. Type markup

   B. Understanding copyfitting

   C. Copyfitting headlines or display type by unit-count method

   D. Copyfitting by the character-count method

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

INTERACTION ITEMS:

1. Why do graphic designers need to understand copyfitting?
2. Why are most copyfitting methods inaccurate for small quantities of type?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Have students select a font and size of display type and determine the units per pica for it. Each student should use a different size and type face. Record the results and make a wall chart for use by student designers.
2. Have students determine from a copyfitting chart the character per pica (CPP) for each of the following types.
    a. 6 pt Garamond (3.59)
    b. 9 pt Spartan Light (2.76)
    c. 10 pt Century Bold (2.14)
    d. 12 pt Paragon
    e. 8 pt Trade Gothic (2.81)
    f. 10 pt Memphis Light (2.33)
    g. 6 pt Bookman (3.39)
3. The instructor should provide several 8-1/2" x 11" pages of typewritten copy. Have students determine the number of characters (key strokes) by one of the methods described in the handouts.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

EVALUATION ITEMS:

1. List four elements to include in type markup.

   a.

   b.

   c.

   d.

2. Identify the following symbols used in type markup.

   a. Bk -

   b. Con -

   c. Bs -

   d. Clc -

   e. Demi -

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 3. Most copyfitting methods are based on exact numbers.

____ 4. CPP can be determined in one of several ways.

____ 5. The unit-count method is useless for such applications as recurring column heads and captions.

____ 6. The character-count method is less suitable for large quantities of copy and is more suitable for one or two lines.

Use the copyfitting handouts provided by your instructor to solve the following problems and write the letter of the correct answer in the space provided.

____ 7. How many units in the following line of display type?

Mary Had A Little Lamb

a. 22
b. 24.5
c. 21
d. 14

____ 8. If a display type calculates to 1.5 units per pica, how long would the following line set be?

Jack and Jill Went Up The Hill

a. 25 picas
b. 16.5 picas
c. 11 picas
d. 30 picas

____ 9. Set 56,000 characters in 8/9 - 18 Caledonia. How long would the column be in picas?

a. 725 picas
b. 1088 picas
c. 907 picas
d. 152 picas

____10. Set 1,600 typewritten characters in 12/12 - 20 Antique. How deep would the type set be in picas?

a. 42 picas
b. 3.5 picas
c. 847 picas
d. 71 picas

____11. How many words should be written to fill a space 15 picas wide by 64 picas deep when the type will be set in 6/8 - 15 Paragon?

a. 15.9 words
b. 2081 words
c. 250 words
d. 379 words

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT II : PREPARING CUSTOMER LAYOUTS

ANSWERS TO EVALUATION ITEMS:

1. a. Family, family members and size of all type faces
   b. The lengths of all lines plus the leading between each line
   c. The line setting such as flush left, flush right, or centered
   d. Any special instructions
2. a. Book face
   b. Condensed
   c. Backslant
   d. Set in caps and lower-case
   e. Demi bold
3. F
4. T
5. F
6. F
7. c
8. b
9. c
10. a
11. d

HO 1

Copyfitting Headlines or Display Type by the Unit-Count Method

A. Units assigned to each letter of the alphabet based on average relationship to average size lower case letter

Capital M, Q, W	2 units
Capital I, J	½ unit
All other caps	1½ units
Lower-case l, i, f, t, j	½ unit
All other lower-case	1 unit
Figure 1	1 unit
All other figures	1½ units
Punctuation	½ unit
$, % &, ?	1½ units
Dash	2 units
Word space	½ unit

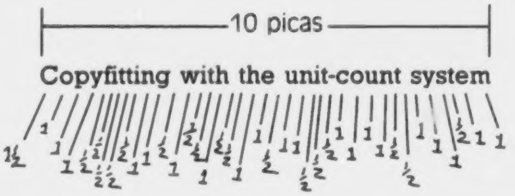
B. Determining units per 10 picas

1. Set a sample of the type you will be using. It makes no difference what the letters are.
2. Mark off 10 picas of the sample.
3, Using the unit chart above, determine the units of that type fitting in 10 picas.
4. Divide these units by 10 (move decimal one place to left) to determine units per pica, This figure will work for this type only. Other sizes and faces will require recalculation.
5. Larger types will require setting the sample 100 picas and moving the decimal 2 places to the left.

Example:

SAMPLE COPY:

CALCULATED UNITS:



= 29 units

= 2.9 units per pica

C. Applying the method

1. Count the units in the copy line to be copyfitted.
2. Divide the number of total units in the line by the units per pica. The result will be the calculated length of the copy line in picas.

Example:

COPY HEADLINE: **Vocational Industrial Clubs of America**

32 Units

32 ÷ 2.9 = 11 picas long

3. This line of type above will set slightly over 11 picas when set in the type size and style of the sample type which was used to calculate the units per pica.
4. **Important: New units per pica count must be calculated for each new size and type face.**

HO 2

Copyfitting by the Character-Count Method

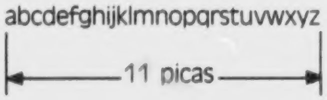
A. Determine the number of characters per pica by one of three methods:

1. Look up the information in a type index or specimen book - most manufacturers have this information available in published form. If this data is not available, determine characters per pica (CPP) by one of the following methods and record it on a chart for future use.

2. Lower Case Alphabet (quick) Method:

   a. Set a lower-case alphabet in the typeface and size needed.

   b. Measure length of alphabet in picas.



   c. Divide 26 by the length of the alphabet (26 characters in alphabet).

$$\frac{26}{11} = 2.36 \text{ CPP}$$

2.36 = the number of characters that will, ***on the average***, fit into one pica of space after set in type. This figure (2.36) is the character per pica (CPP) count for that typeface and size. ***It is only an average.***

3. Longer Method: Many believe this is the most accurate method of determining characters per pica (CPP) for a typeface and size.

   a. Set any copy in selected typeface and size.

   b. Set in lines 20 picas in length.

   c. Set at least five lines.

   d. Count total characters (each letter, figure, space, punctuation) in five lines.

   e. Divide total characters by 100 (move decimal two places to left). Five 20-pica lines is equal to one 100 pica line.

Example: 236 total characters in five 20 pica lines.

$$\frac{236}{100} = 2.36 \text{ CPP}$$

   f. As in the quick method, this result is ***only an average***, but because it is determined over a larger sample, it is generally considered to be more accurate.

B. Count total characters in copy to be set. There are several methods, but each results in an estimate based on averages; unless one wishes to laboriously count each letter, space, figure, etc. If there is sufficient copy, this estimate based on averages can be very accurate.

1. Determine the average line length of typewritten copy. This is an estimate taking into account indentions, short paragraph line endings, etc.
2. Count the characters in an average line.
3. Count the number of lines on the average typewritten page of copy.
4. Count the number of average pages.

5. Multiply characters per average line by lines per average page. Multiply this product by the number of average pages. Add to this the characters on partial pages.
6. To be more accurate, you can go back to the copy and:
    a. Subtract characters in lines which are shorter than average.
    b. Add characters in lines which are longer than average.
    c. Subtract characters for indentions.
    d. Subtract characters for short paragraph ending lines.
7. This result equals the approximate number of characters (or keystrokes) in the copy.

Example:

Total Characters = (characters per line) x (lines per page) x (number of pages) + (characters per partial page)

Characters per line	66
Lines per page	28
Number of pages	40
Characters per partial page	320

$$(66) \times (28) \times (40) + 320 = 74{,}240 \text{ Characters}$$

This is an estimate, but it is based on such a large sample that it should be very accurate.

C. Copyfit - determine space required for given amount of copy set in given typeface and size.

1. Divide number of total characters by CPP.
2. Divide above (1) by set measure.
3. Multiply above (2) by set leading.
4. Divide above (3) by points per pica (or points per inch).
5. Result will provide length of column in picas.

Problem Example:
Determine the length of column of set type in picas.

2000 characters of copy set 8/10 - 21 Bodoni Bold Italic. Bodoni Bold Italic has a character per pica count of 2.0. (CPP 2.0)

$$\frac{\left(\frac{2000}{2}\right)}{21} \times \frac{10}{12} = \frac{1000}{21} \times \frac{10}{12} = 40 \text{ picas deep}$$

In words:

$$\frac{\left(\frac{\text{total characters}}{\text{characters per pica}}\right)}{\text{set measure}} \times \frac{\text{set leading}}{\text{points per pica}} = \text{column depth in picas}$$

Explanation:

- On the average, one can fit two characters into each pica of 8-point Bodoni Bold Italic.
- Therefore, divide total characters by two to determine how long in picas this 2000 character line would be.
- Then divide this extremely long line into short lines by dividing it by the 21 pica set measure.
- The total of the above is the number of 8-point Bodoni Bold Italic lines 2000 characters will make. Because we are interested in the resulting depth of the column, the total lines should be rounded up to a whole number.

- Total lines are then multiplied by set leading (10 points). Set leading is the amount of vertical space each line consumes. This result will be expressed in points.
- Because points are such small units, column lengths (or depths) are usually expressed in picas or inches.
- To convert the column depth to picas, divide the total points by 12. (12 points per pica)
- To convert the column depth to inches, divide the total points by 72. (72 points per inch)

Problem Example:
Determine column length of set type in inches.

7280 characters of copy set 6/9 - 12 News Gothic (4.2 CPP)

$$\frac{\left(\frac{7280}{4.2}\right)}{12} \times \frac{9}{72} = \frac{1733.3}{} \times \frac{9}{72} = 18 \text{ inches deep}$$

In words:

$$\frac{\left(\frac{\text{total characters}}{\text{characters per pica}}\right)}{\text{set measure}} \times \frac{\text{set leading}}{\text{points per inch}} = \text{length of column in inches}$$

D. Copyfit - determine number of words that need to be written to fill a given space.

1. Multiply the set measure by CPP.
2. Multiply column lengths (in picas) by points per pica (12).
3. Divide above (2) by set leading.
4. Multiply set measure (1) by set leading (3).
5. Divide above (4) by 5.5.
   Note: 5.5 is the number of characters in an average word. This can be tested by counting all characters (letters, figures, spaces, etc.) in a body of copy and dividing it by the number of words in that copy.

Problem Example:
Determine the number of average words that need to be written to fill a column 18 picas wide by 76 picas deep. Type to be set is 8/9 - 18 Tempo (2.5 CPP).

$$\frac{(18 \times 2.5) \times \frac{(76 \times 12)}{9}}{5.5} = \frac{45 \times 101.3}{5.5} = 829 \text{ words}$$

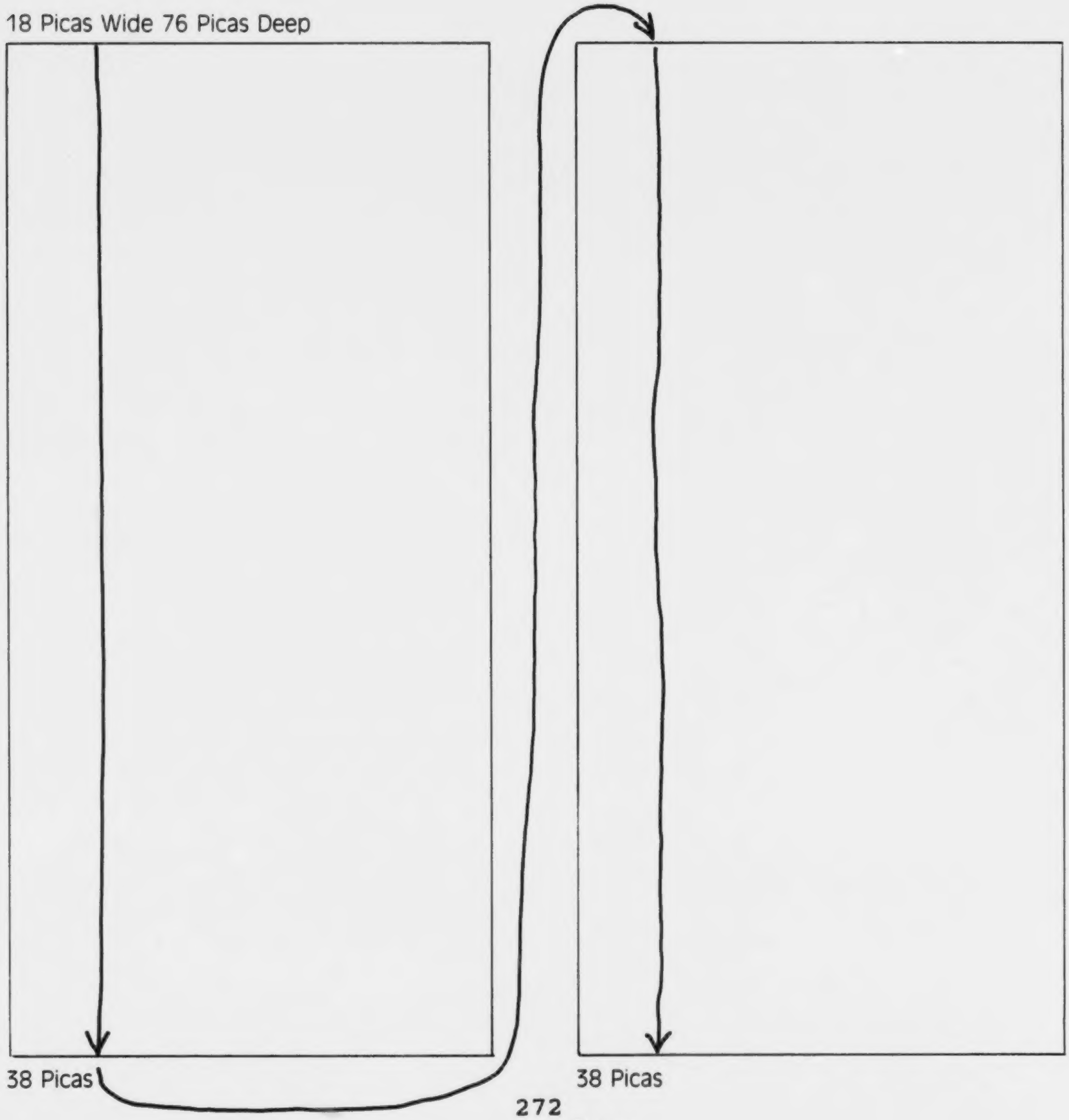
In words:

$$\frac{(\text{set measure})\,(\text{character per pica}) \times \frac{(\text{column depth}) \times (\text{points per pica})}{\text{set leading}}}{\text{characters per average word}} =$$

$$\frac{(\text{character per line}) \times (\text{total lines})}{\text{character per average word}} = \text{total words}$$

Explanation:

- Multiplying the set measure (line length) times the CPP will determine the number of characters that will fit into a line.
- The column depth is then converted to points by multiplying by 12 (points per pica).
- Dividing the column depth by set leading (vertical size of each line) will result in the number of lines in the column.
- Multiplying the characters per line times the number of lines will result in the number of characters that will fit into the column.
- Finally, dividing the total characters in the column by the average word size (5.5) indicates the number of words needed to fill that column.



ASSIGNMENT SHEET 1 - COPYFITTING

Directions: Use a copyfitting chart to complete the following exercises.

Part I

Copyfit 7500 characters set in 8/10-22 Trade Gothic.

A. How long would the column be in picas?

B. How long would the column be in inches?

Part II

Copyfit 40,000 characters set 10/11-18 Memphis Light.

A. How long would the column be in picas?

B. How many pages of 48 pica columns would this copy make?

Part III

Determine the number of words needed to be written to fill a column 20 picas wide by 74 picas deep, when set in 9/10-20 Spartan Light.

ANSWERS TO ASSIGNMENT SHEET

ASSIGNMENT SHEET 1 - COPYFITTING

Part I

8 point Trade Gothic - 2.81 cpp

A.

$$\frac{\left(\frac{7500}{281}\right)}{22} \times \frac{10}{12} = \frac{2669}{22} \times \frac{10}{12} = \frac{121 \times 10}{12} =$$ 100.83 picas

B.

$$\frac{\left(\frac{7500}{281}\right)}{22} = \frac{10}{72} = \frac{2669}{22} \times \frac{10}{72} = \frac{121 \times 10}{72} =$$ 16.8 inches

Part II

10 point Memphis Light - 2.33 cpp

A.

$$\frac{\left(\frac{40{,}000}{2.33}\right)}{18} \times \frac{10}{12} = \frac{17167}{18} \times \frac{10}{12} = \frac{954 \times 10}{12} =$$ 795 picas

B.

$$\frac{795}{48} =$$ 16.5625 pages

Part III

9 point Spartan Light - 2.76 cpp

$$\frac{(2.76 \times 20) \times \left(\frac{74 \times 12}{10}\right)}{5.5} = \frac{\left(\frac{55.2 \times 888}{10}\right)}{5.5} =$$

$$\frac{4901}{5.5} =$$ 891 words

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

SCOPE OF UNIT:

This unit provides typesetting background information and teaches the skills necessary for typesetting performance. The unit covers the development of typesetting, printers' measurements, type and design impact and photocomposition, proofreading, word processing, optical character recognition and telecommunication.

INFORMATION TOPIC: III-1 OR DEMONSTRATION:

DEVELOPMENT OF TYPESETTING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify cultural factors that influenced the development of the alphabet and movable type.
2. Match various individuals to the appropriate contribution to typesetting.
3. List three factors which created a demand for faster typesetting.
4. Identify characteristics of linecasting machines.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Monotype

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. *Comprehensive Graphic Arts*. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 2, unit 8, pp. 18-20; units 27-29, pp. 73-83.

Spence, Wm. P. and David G. Vequist. *Graphic Reproduction*. Peoria, IL: Charles A. Bennett, 1980, ch. 7, pp. 143-153; ch. 8, pp. 154-161.

Adams, J. Michael and David D. Faux. *Printing Technology*. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 16, pp. 390-402.

REFERENCES:

Walker, John R. *Graphic Arts Fundamentals*. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 1, pp. 1-20.

Struss, Victor. *The Printing Industry*. Washington, DC: Printing Industries of America, 1967.

Blair, Raymond N., ed. *The Lithographer's Manual*. 7th ed. Pittsburgh, PA: The Graphic Arts Technical Foundation, 1983.

Pocket Pal. 13th ed. New York, NY: International Paper Co., 1983.

INTRODUCTION:

The development of typesetting and photocomposition is based on a foundation of terms and innovations from earlier typesetters and their equipment. The alphabet for design and the "hot" linecasting process for proportional spacing, lead us into the era of automatic photocomposition.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

OUTLINE: (Key Points)

I. Cultural Influences on the Development of Typesetting

- A. Origin of the alphabet
  - 1. Phoenicians - the earliest culture from which we derived our alphabet
  - 2. Greeks
  - 3. Romans - added these features:
    - a. Capital letters
    - b. Lower-case letters
    - c. Punctuation
- B. Foundry type
  - 1. Eastern civilizations (Asian type)
    - a. Pi-Sheng
    - b. Koreans
  - 2. Western civilizations (European type) - Gutenberg
    - a. Metal type successful
    - b. Fewer characters in alphabets
  - 3. Type is produced by casting hot metal (lead); hot composition (relief process)

II. Factors Which Created a Demand for Faster Typesetting (1450-1890)

- A. Better education
- B. Industrial revolution
- C. Improved presses

D. Advent and popularity of newspapers

E. More demand for reading material

III. Development of Linecasting Machines (Hot Composition)

A. Linotype

1. Invented - 1886
2. Inventor - Ottmar Mergenthaler
3. Characters assembled - matrices, keyboard
4. Characters stored - in magazine
5. Characters distributed - matrices, automatic
6. Casting - line

B. Monotype (HO 1)

1. Invented - 1889
2. Inventor - Tolbert Lanston
3. Characters assembled - punched ribbon
4. Characters stored - ribbon
5. Characters distributed - none
6. Casting - individual letters
7. Cluster concept - several keyboards feeding one casting unit

C. Ludlow

1. Invented - 1911
2. Inventor - Washington Ludlow
3. Characters assembled - hand
4. Characters stored - type case
5. Characters distributed - hand
6. Casting - line

IV. Summary and Conclusion

   A. Cultural influences on the development of typesetting

   B. Factors which created a demand for faster typesetting (1450-1890)

   C. Development of linecasting machines (hot comparison)

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

INTERACTION ITEMS:

1. What did early alphabet characters represent?
2. What factors demanded faster methods of setting type?
3. What does the term "hot" composition reflect?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Draw characters of the three alphabets to trace the transition from ideographs to modern letters.
2. Chart the letters that have been added to the alphabet through the centuries.
3. Compare the suitability of clay, bronze and lead as the primary property used in molding foundry type.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

EVALUATION ITEMS:

Select the correct answer to the following questions and place the letter of that answer in the blank provided.

___ 1. The earliest culture from which we derived our alphabet was:

a. Egyptians
b. Phoenicians
c. Greeks
d. Chinese

___2. The culture that added lower-case letters and punctuation to their alphabet was:

a. Phoenicians
b. Chinese
c. Romans
d. Greeks

Match the individuals listed on the right to the appropriate contribution to typesetting on the left.

____ 3. Linotype

____ 4. European type

____ 5. Asian type

____ 6. Monotype

a. Ludlow

b. Gutenberg

c. Mergenthaler

d. Lanston

e. Pi-Sheng

7. List three factors which created a demand for faster typesetting.

a.

b.

c.

Select the correct answer to the following questions and place the letter of that answer in the blank provided.

____ 8. The linecasting machine that is an example of hot composition is:

a. Linotype
b. Monotype
c. Ludlow
d. All of the above

____ 9. The Linotype machine has character storage in the form of a:

a. Tape
b. Magazine
c. Ribbon
d. Type case

____10. The linecasting machine that typically casts individual letters is:

a. Ludlow
b. Monotype
c. Linotype
d. All of the above

____11. The cluster concept is associated with:

a. One keyboard feeding several casting units
b. Phoenician punctuation
c. More than one casting machine in a production area
d. More than one keyboard feeding a casting unit

____12. The Ludlow linecasting machine stores characters in a:

a. Ribbon
b. Type case
c. Magazine
d. Computer

LESSON PLAN: 1

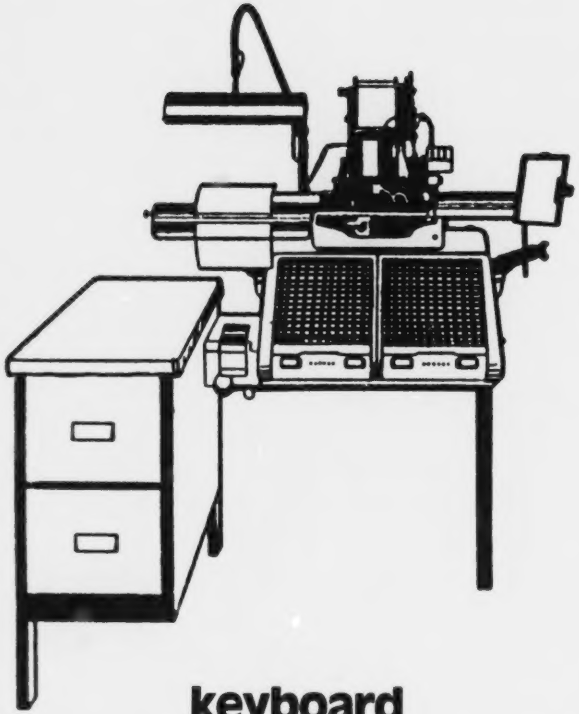
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

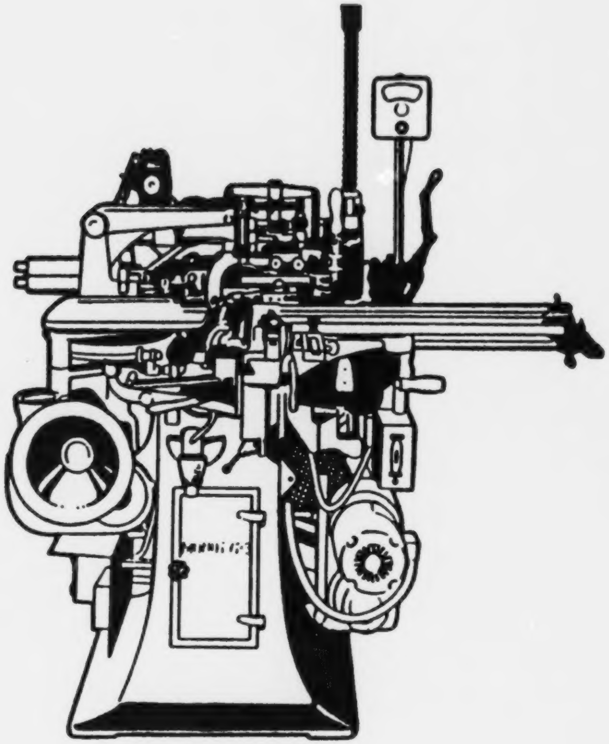
ANSWERS TO EVALUATION ITEMS:

1. b
2. c
3. c
4. b
5. e
6. d
7. The student may list any three of the following:
    a. Better education
    b. Industrial revolution
    c. Improved presses
    d. Advent and popularity of newspapers
    e. More demand for reading material
8. d
9. b
10. b
11. d
12. b

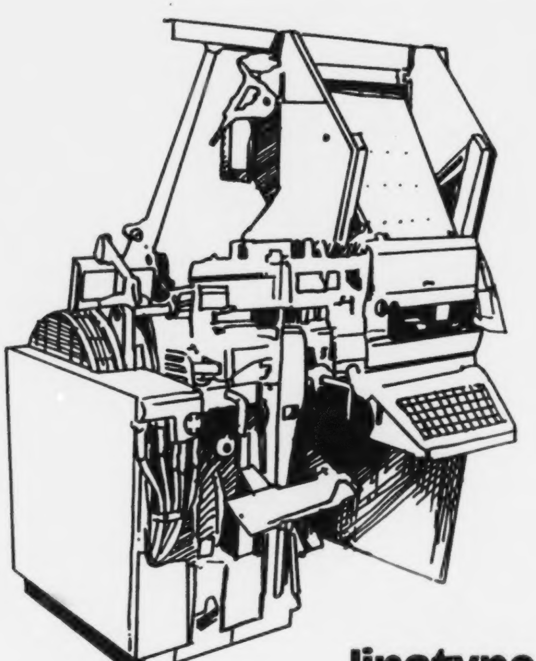
MONOTYPE



keyboard



caster



linotype

HO 1

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

SCOPE OF UNIT:

This unit provides typesetting background information and teaches the skills necessary for typesetting performance. The unit covers the development of typesetting, printers' measurements, type and design, impact and photocomposition, proofreading, word processing, optical character recognition and telecommunication.

INFORMATION TOPIC: OR DEMONSTRATION: III-2

COMPOSING WITH FOUNDRY TYPE

(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Compose a paragraph in foundry type according to the steps of procedure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Placing Type in the Stick
2. HO 2: Spaces Used in Setting Type
3. HO 3: California Job Case
4. Type in California Job Case
5. Composing Stick
6. Leads and Slugs
7. Proof Press
8. Ink
9. Paper

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

REFERENCES:

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980.

Struss, Victor. The Printing Industry. Washington, DC: Printing Industries of America, 1967.

Blair, Raymond N. ed. The Lithographer's Manual. 7th ed. Pittsburgh, PA: The Graphic Arts Technical Foundation, 1983.

Pocket Pal. 13th ed. New York, NY: International Paper Co., 1983.

INTRODUCTION:

This lesson will demonstrate the steps in setting type by hand with foundry type and a composing stick. Remember to use proper hyphenation when splitting words and be sure to proofread the galley at the end of the process.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

STEPS OF PROCEDURE:

1. Select the type to be used.
2. Set the composing stick at the desired line length.
3. Insert a slug. (HO 1)
4. Set the first line in capital letters and center copy by placing equal amount of spacing on each side of the type. (HO 2)
5. Place a slug between the top line and the next line.
6. Indent the paragraph two (2) ems and set the copy until the composing stick has no more room on that line.

   NOTE: Determine if a word will fit or if hyphenation is needed. Use only proper hyphenation. Consult the dictionary if questionable.
7. Adjust the spacing evenly between words until the type is snug in the composing stick.
8. Repeat the process for the remaining lines as needed.
9. Add a lead between each line of the body copy of the paragraph.
10. At the end of the last word of copy, place spacing until the line is snug.

    NOTE: Interword spacing can remain at normal for this line.
11. Place a slug at the end of the exercise.
12. Using either a magnet or string, hold the type firm and pull a galley proof.
13. Proofread the copy and make necessary corrections.
14. Distribute back into the California type case. (HO 3)

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

INTERACTION ITEMS:

1. Which foundry type characters are difficult to distinguish from one another?

2. Why is it important to make a galley proof?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

EVALUATION ITEMS: NAME OF STUDENT:____________________

COMPOSING WITH FOUNDRY TYPE

Compose the following paragraph in foundry type on a line length of two and one-half inches. Justify the copy so that both the left and right margins are even. Check for mistakes and correct. Distribute the type back into the California type case.

DIPHTHONGS

Diphthongs are specially cast characters, usually vowels, designed to meet a special purpose. Gutenberg cast nearly 200 symbols for his Bible.

EQUIPMENT:

1. Type in California Job Case
2. Leads and Slugs
3. Proof Press
4. Ink
5. Paper

DID THE STUDENT:	YES	NO
1. Select type to be used.		
2. Set composing stick at 15 picas.		
3. Insert slug.		
4. Set first line in capital letters and center copy.		
5. Place slug between top line and next line.		
6. Indent paragraph two (2) ems and set copy to fill line.		
7. Adjust spacing between words.		
8. Repeat for remaining lines as needed.		
9. Insert lead between each line.		

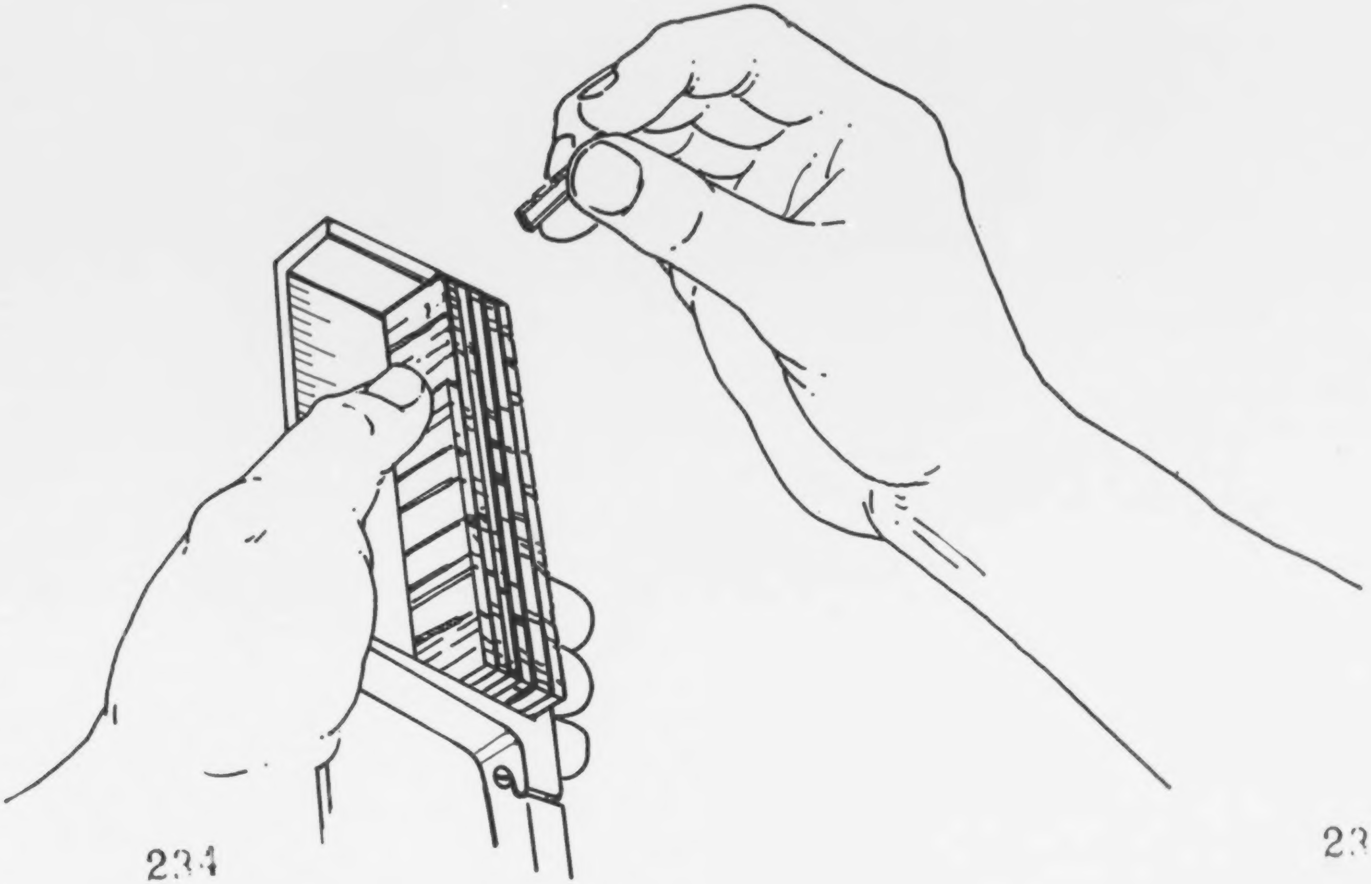
DID THE STUDENT:	YES	NO
10. Insert spacing at end of the copy until line is snug.		
11. Place slug at end of paragraph.		
12. Pull galley proof.		
13. Proofread copy and make corrections.		
14. Distribute type back into California type case.		

The student has satisfactorily completed the procedure "COMPOSING WITH FOUNDRY TYPE" according to the steps outlined.

____
Instructor's Signature
(Verifying Satisfactory Completion)

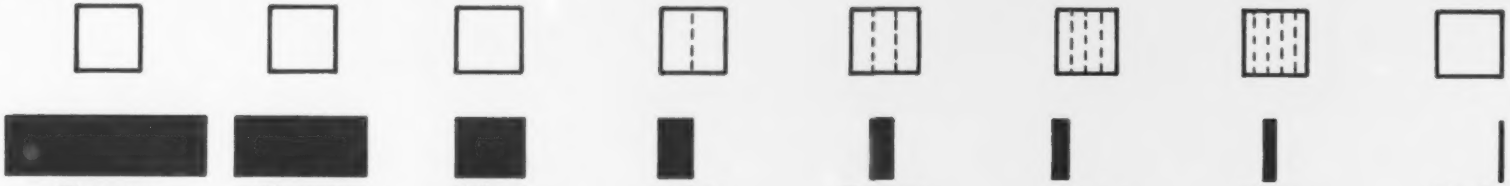
____
Date

PLACING TYPE IN THE STICK



HO 1

SPACES USED IN SETTING TYPE



3-em Quad

2-em Quad

Em Quad

En Quad

3-em Space

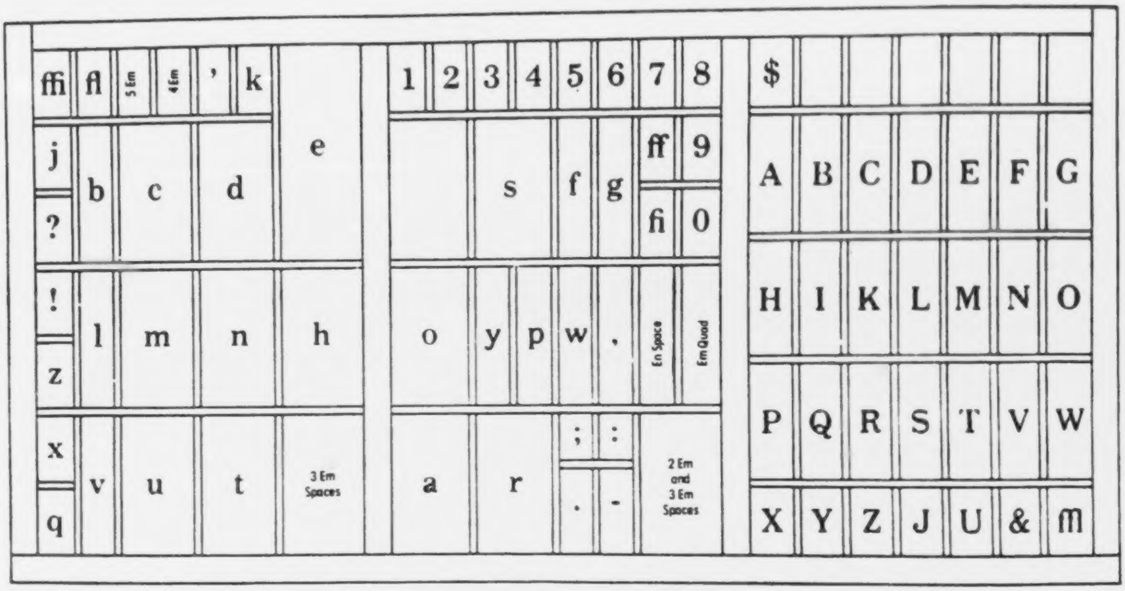
4-em Space

5-em Space

Hair Space

HO 3

CALIFORNIA JOB CASE


ffi
fl
5 Em
4 Em
'
k
e
1 2 3 4 5 6 7 8
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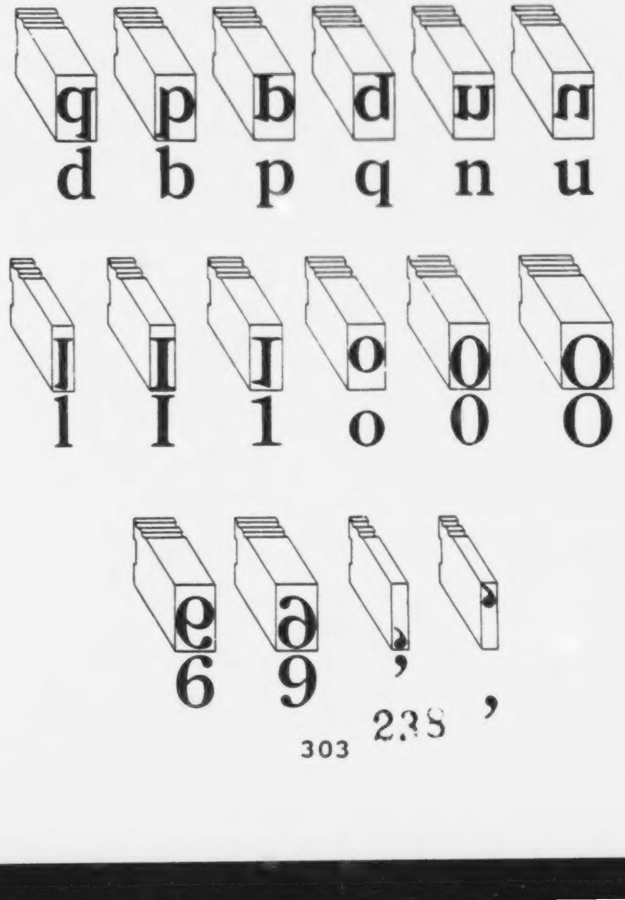
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LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

SCOPE OF UNIT:

This unit provides typesetting background information and teaches the skills necessary for typesetting performance. The unit covers the development of typesetting, printers' measurements, type and design, impact and photocomposition, proofreading, word processing, optical character recognition and telecommunication.

INFORMATION TOPIC: III-3 OR DEMONSTRATION:

PRINTERS' MEASURES
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Define printers' measures.
2. Convert inches to printers' measures.
3. Convert metrics measures to printers' measures.
4. Identify printers' measures terms that relate to typesetting functions.
5. Prepare a conversion chart for inches, points, picas, and millimeters.
6. Given a line length, various type sizes, and the number of lines per page, compute the number of ems per line and per page for each.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Conversion Tables
2. HO 2: Em Chart
3. AS 1: Printers' Terms
4. AS 2: Conversion Chart
5. AS 3: Working with Ems

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, unit 19, pp. 40-46.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch. 3, pp. 42-49.

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 4, pp. 58-59.

REFERENCES:

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 5, pp. 44-46.

INTRODUCTION:

A thorough knowledge of printers' measurements is essential in typesetting. Measurements in typesetting equipment are expressed in points and picas. As these terms are used throughout the graphic arts industry, their applications are many and varied.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

INSTRUCTOR NOTE: Have students review lesson 3 of Unit II, including TM 1 and TM 2.

OUTLINE: (Key Points)

I. Inches in Relation to Printers' Measures (HO 1)

   A. Point - a measurement equal to approximately 1/72 of an inch

   B. Pica - a measurement equal to approximately 1/6 of an inch; a pica equals 12 points

   C. Agate inch - a measure in advertising equal to 5-1/2 points; fourteen agate lines equal one inch

   D. Em - a type measurement equal to the square of the type size

      1. 10-point type - an em equals 10 points

      2. 36-point type - an em equals 36 points

   E. En - one half of an em

   F. Thin space - one third of an em

II. Metric System in Relation to Printers' Measures

   A. Point - a point is equal in measurement to .35 millimeters

   B. Pica - a pica is equal in measurement to 4.20 millimeters

   C. Agate - an agate is equal in measurement to 1.92 millimeters

   D. Em - definition of an em does not change because of its relative relationship with the point measurement (HO 2)

III. Spacing

   A. Leading - amount of space, usually in points, added between the descender of one line and the ascender of the next line; does not include the type size

B. Set leading - amount of space, in points, from the baseline of one line of type to the baseline of the next line of type; includes the point size of the type

C. Fixed spacing - measurement determined by the point size which remains that size until the type size is changed; fixed spacing includes the em space, the en space, and the thin space

D. Variable spacing - spacing changes within the same point size; space bar expands to justify the line of copy; insert space command expands the space between the words to fill the space necessary

E. Line gauge - a measuring device similar to a ruler used by printers; may contain inches, agates, picas, points, metrics, or any combination of these

IV. Summary and Conclusion

A. Inches in relation to printers' measures

B. Metric system in relation to printers' measures

C. Spacing

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

INTERACTION ITEMS:

1. Define printers' terms and relate them to inches.
2. Relate printers' measures to the metric system.

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Prepare a conversion chart for inches, points, picas and millimeters.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

EVALUATION ITEMS:

Select the correct answer from the following choices. Mark the appropriate letter in the space provided.

___ 1. A space 2 inches wide by 3 inches long would have what dimensions in picas?

- a. 14 picas by 20 picas
- b. 12 picas by 21 picas
- c. 12 picas by 18 picas
- d. None of the above

___2. An agate is how many points?

- a. 5-1/2
- b. 6
- c. 9
- d. 14

___3. An em in half-inch type is how many points?

- a. 18 points
- b. 24 points
- c. 36 points
- d. 30 points

___4. 12 picas is equal to which of the following?

- a. 1 inch
- b. 60 millimeters
- c. 25 millimeters
- d. 2 inches

Write the correct answer in the space provided.

5. A rule 4-1/2 inches long is ______ picas long.

6. ________ lines of 8-point type will fit in two inches of space.

7. A set leading of 18 points would allow _________ lines in 2 inches.

8. A box 2 inches wide and 3 inches deep would be _____ millimeters by __________ millimeters deep. (Round your answers.)

9. An advertising agency sends an advertisement that is 6 agate inches deep. How many picas is that? ______

10. A 6-inch ruler is ______ picas long.

11. A rule one centimeter long is ______ inches long. (Round your answer.)

12. There are ____ points in an inch.

13. There are ____ points in a pica.

14. There are ____ picas in an inch.

15. An em in 10-point type would be _____ points wide.

16. A 3-em indention in 8-point type would be a _______ pica indention.

17. An en space in 12-point type would be equal to ____ points.

18. An em in 72-point type is ____ picas.

19. In 24-point type an 2-em space would be _____ picas.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

ANSWERS TO EVALUATION ITEMS:

1. c
2. a
3. c
4. d
5. 27
6. 18
7. 4
8. 50 x 75 (rounded)
9. 36
10. 36
11. 39 (rounded)
12. 72
13. 12
14. 6
15. 10
16. 2
17. 6
18. 6
19. 4

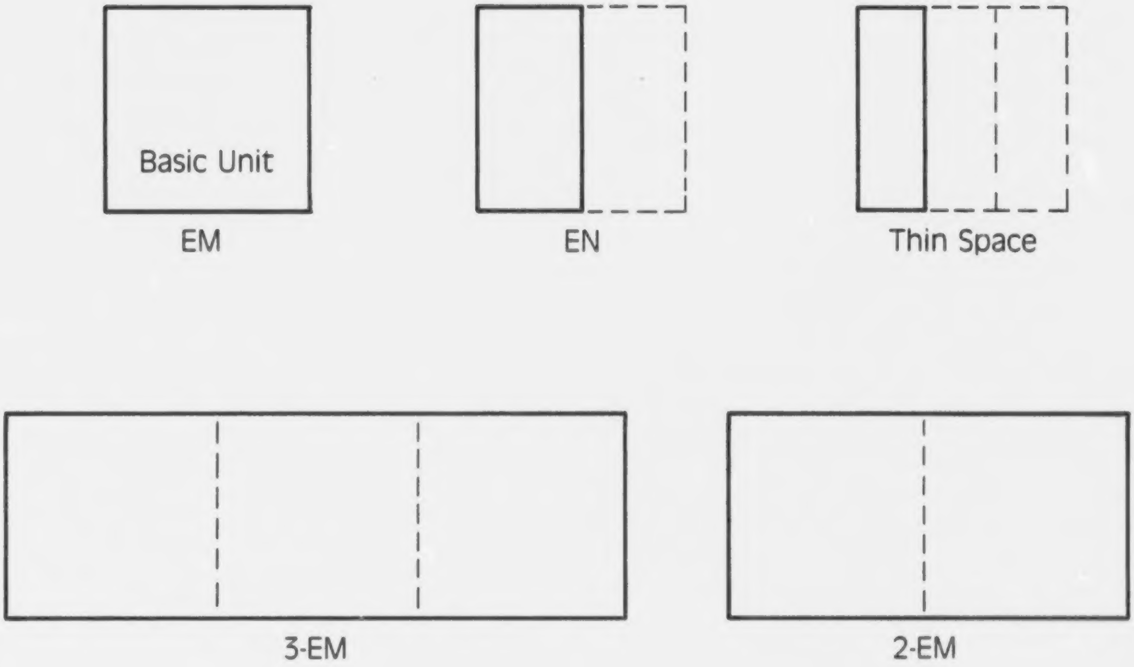
Conversion Tables

PICAS	POINTS	DECIMAL INCHES	MILLIMETERS
	1	0.014	0.35
	2	0.028	0.70
	3	0.042	1.05
	4	0.055	1.40
	5	0.069	1.75
	6	0.083	2.10
	7	0.097	2.45
	8	0.111	2.80
	9	0.125	3.15
	10	0.138	3.50
1	12	0.166	4.20
	14	0.194	4.90
	18	0.249	6.30
2	24	0.332	8.40
	30	0.414	10.50
3	36	0.498	12.60
	42	0.581	14.70
4	48	0.664	16.80
5	60	0.828	21.00
6	72	0.996	25.20

MILLIMETERS	POINTS	PICAS AND POINTS	DECIMAL INCHES
1	2.86		0.039
2	5.71		0.079
3	8.57		0.118
4	11.43		0.157
5	14.29	1 + 2¼	0.197
6	17.14	1 + 5	0.236
7	20.00	1 + 8	0.276
8	22.86	1 +10¾	0.315
9	25.71	2 + 1½	0.354
10	28.57	2 + 4½	0.394
15	42.86	3 + 6¾	0.591
20	57.14	4 + 9	0.787
25	71.43	5 + 11	0.984
30	85.71	7 + 1¼	1.181
35	100.00	8 + 3½	1.378
40	114.28	9 + 5¾	1.575
45	128.57	10 + 4	1.772
50	142.83	11 + 6¼	1.969
75	214.28	17 + 5¼	2.953
100	285.71	23 + 8½	3.937

HO 2

EM Chart


Basic Unit
EM
EN
Thin Space
3-EM
2-EM

An EM is the square of the point size.

ASSIGNMENT SHEET 1 - PRINTERS' TERMS

Directions: This assignment sheet will help you review and check your understanding of the information presented in this lesson. Define the following printers' terms:

1. Set leading:
2. Leading:
3. Agate inch:
4. Fixed spacing:
5. Variable spacing:
6. EM:
7. EN:
8. Thin space:
9. Line gauge:
10. Pica:

ASSIGNMENT SHEET 2 - CONVERSION CHART

Directions: Prepare a conversion chart showing inches to picas/points. Then convert to millimeters.

INCHES	¼	½	¾	1	¼	½	¾	2	¼	½	¾	3	¼	½	¾	4
POINTS																
PICAS																
MILLIMETERS																

ASSIGNMENT SHEET 3 - WORKING WITH EMS

EMs are often used when determining performance on a typesetter--both speed and skills. Determining cost of typesetting is also often done with the use of EMs. This exercise is to familiarize you with the use of EMs.

Part I

Given a line length of four inches: (Hint: To determine EMs, divide the total points in the line by the point size.)

1. 8-point type would have _____ EMs per line
2. 12-point type would have _____ EMs per line
3. 18-point type would have _____ EMs per line
4. 9-point type would have _____ EMs per line
5. 24-point type would have _____ EMs per line

Part II

If there are 25 lines per page, how many EMs of each of the above are there on each page?

1. _______
2. _______
3. _______
4. _______
5. _______

ANSWERS TO ASSIGNMENT SHEETS

ANSWERS TO ASSIGNMENT SHEET 1 - PRINTERS' TERMS

1. Set leading: the amount of space, in points, from the baseline of one line of type to the baseline of the next line of type
2. Leading: the amount of space between two lines of type; measured from bottom of descender to top of ascender in the following line
3. Pica: a unit of printers' measure equal to 12 points; six picas equal one inch
4. Point: a unit of printers' measure approximately 1/72 of an inch
5. Agate inch: term used to measure advertisements and classified matter in newspapers; equal to 5½ point type size; fourteen agate lines to the inch
6. Fixed spacing: spacing that is standard and fixed for that point size; the EM, EN, and thin space are fixed spaces
7. Variable spacing: spacing that varies within a point size; the space between words, the insert space, insert leader, and insert rule are examples
8. EM: the square of the point size
9. EN: one half of an EM
10. Thin: one third of an EM
11. Line gauge: measuring device similar to a ruler used by printers; may contain inches, agates, picas, points, metrics, or any combination of these

ANSWERS TO ASSIGNMENT SHEET 2 - CONVERSION CHART

INCHES	¼	½	¾	1	¼	½	¾	2	¼	½	¾	3	¼	½	¾	4
POINTS	18	36	54	72	90	108	126	144	162	180	198	216	234	252	270	288
PICAS	1½	3	4½	6	7½	9	10½	12	13¼	15	16½	18	19½	21	22½	24
MILLIMETERS	6.3	12.6	15.75	25.2	31.5	37.8	44.1	50.4	56.7	63	69.3	75.6	81.9	88.2	94.5	100.

ANSWERS TO ASSIGNMENT SHEET 3 - WORKING WITH EMS

Part I	Part II
1. 36	1. 900
2. 24	2. 600
3. 16	3. 400
4. 32	4. 800
5. 12	5. 300

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

SCOPE OF UNIT:

This unit provides typesetting background information and teaches the skills necessary for typesetting performance. The unit covers the development of typesetting, printers' measurements, type and design, impact and photocomposition, proofreading, word processing, optical character recognition and telecommunication.

INFORMATION TOPIC: III-4 OR DEMONSTRATION:

PROOFREADING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Match proofreaders' marks to the correct meaning.
2. Identify various types of proofs.
3. Identify requirements for effective proofreading.
4. Proofread copy using proofreaders' marks.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Proofreaders' Marks
2. HO 2: We Never Make Misteakes
3. AS 1: Proofreading Copy
4. AS 2: Types of Proofs
5. Audiovisual Resource: AV86 - "Proofreading" by Robert Tipton, The Graphic Arts Technical Foundation, 4615 Forbes Ave., Pittsburgh, PA 15213

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, units 37-40, pp. 109-115.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch. 6, pp. 133-134.

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 16, pp. 403-406.

REFERENCES:

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980.

INTRODUCTION:

Printed matter must have no mistakes. Proofreaders must be very accurate, knowledgeable of type, and clear and concise with their marks. In addition to spelling, proofreaders must check hyphenation, spacing, punctuation and size and style of type. More than a single proof is usually required.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

OUTLINE: (Key Points)

I. Proofreaders' Marks (HO 1)

   A. Legibility - proofs must be marked legibly to enable typesetter to easily read the correction; standard proofreaders' marks are used in the industry

   B. Using contrasting color pens/pencils - contrasting color pens or pencils allow the typesetter to easily find corrections to be set; proofreaders' marks should be large enough for easy recognition

II. Types of Proofs (HO 2)

   A. Galley proof

      1. First proofread by proofreader after the copy is set

      2. If there are many errors in the galley proof a second galley proof may be used

      3. Originates in typesetting area

      4. Could go to layout area for copyfitting

      5. Final correct copy should accompany typed copy to paste-up area

   B. Brown line proof ("Van Dyke")

      1. Proof of the copy after paste-up (originates in paste-up area)

      2. Checked against comprehensive layout

      3. Often approved by customer

      4. Final copy accompanies paste-up to camera area

   C. Page proof

      1. Proof that is made prior to making a plate (originates in pressroom)

    2. Checked against working dummy and paste-up copy
    3. Approved by customer representative
    4. Remains with job ticket

  D. Press proof

    1. Sheet of product after it has been printed
    2. Approved before the press run is made

  E. Reproduction proof ("slick")

    1. Final high-quality approved proof photographed for distribution to other paste-up areas or customers
    2. Occasionally a camera-ready proof "pulled" from hot composition
    3. Often used by advertising agencies to send advertisements to printers

  F. Author's alterations

    1. Changes made by author after copy has been submitted to printer
    2. Normally charged to customer by the printer
    3. Necessitates copy being returned to typesetting area
    4. Requires another set of galley and brown line proofs

III. Qualifications of a Proofreader

  A. Good command of English language
  B. Good speller
  C. Good medium-speed reader
  D. Good listener
  E. General background in type and printing
  F. Enjoys reading
  G. Good eyesight

IV. Other Requirements for Effective Proofreading

A. Environment - quiet, isolated room, where proofreader can work with copyholder without interruption and distraction

   1. Light - should be soft, indirect, with no glare

   2. Noise - facility should be isolated from noise to allow concentration on copy; acoustical tile and panels, and carpet help lower the noise level

B. Resource materials

   1. Dictionary - current, unabridged dictionary used to check information and spelling

   2. Reference books - reference books should be available to check detailed and technical information

   3. Type style references - a typeset copy of all type styles available in the typesetting department for comparison with the markup

   4. Type size chart - a type size chart showing all sizes of type available for comparison with the customer's markup

   5. Original copy - the original copy should be typed, double spaced with one-inch margin for ease of typesetting and proofreading; usually held by the copyholder who often shares reading with the proofreader

   6. Rough/comprehensive layout - a layout or guide for the typesetter to follow when setting the type; proofreader checks overall measurements and format against the layout

C. Tools and equipment

   1. Colored pencils/pens

   2. Ruler

   3. Type gauge

D. Copyholder - individual with good English skills who reads the copy aloud to the proofreader

   1. Spells out difficult words to the proofreader

2. One person may act as proofreader and copyholder but this is less desirable.

V. Summary and Conclusion

- A. Proofreaders' marks
- B. Types of proofs
- C. Qualifications of a proofreader
- D. Other requirements for effective proofreading

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

INTERACTION ITEMS:

1. Identify proofreaders' marks and their meanings.
2. Identify the various types of proofs: galley proof, brown line proof, page proof, press proof, and reproduction proof.

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Proofread printed copy using proofreaders' marks including printers' instructions for typesetting.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

EVALUATION ITEMS:

Match the following most common proofreaders' marks with the correct meaning.

_____	1.	#	a.	Delete
_____	2.	$\overset{,}{\wedge}$	b.	Close up
_____	3.	ital.	c.	Set in bold type
_____	4.	tr	d.	Insert space
_____	5.	₰	e.	Set in italic type
_____	6.	¶	f.	New paragraph
_____	7.	⊐¶	g.	Lower-case letter
_____	8.	$\overset{\frown}{\smile}$	h.	Transpose
_____	9.	bf	i.	Insert comma
_____	10.	B̸	j.	Indent paragraph

For each of the following, write "T" if the statement is true, or "F" if it is false.

11.____ The proofreader, when reading to the copyholder, spells out difficult words.

12.____ One person may perform both tasks of proofreader and copyholder.

13.____ Black pen is used to mark proofs.

14.____ A high-quality proof, used as the original in making multiple copies by photo reproduction, is called a Van Dyke.

15.____ Authors' alterations are made at the printer's expense.

16.____ A proofreader is not bothered by noise because of his/her concentration.

17.____ A page proof requires the approval of the customer of his/her representative.

18.____ A brown print proof should be distributed to the layout area.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

ANSWERS TO EVALUATION ITEMS:

1. d
2. i
3. e
4. h
5. a
6. f
7. j
8. b
9. c
10. g
11. F
12. T
13. F
14. F
15. F
16. F
17. T
18. T

Proofreaders' Marks

₰	Delete
₰̂	Delete and close up
๑	Turn inverted letter
⁀‿	Close up
#	Insert space
√√√	Equalize spacing
less #	Reduce spacing
¶	Paragraph
□	Indent one em
[	Move to left
]	Move to right
⊔	Lower
⊓	Elevate
∧	Insert marginal addition
X	Broken letter
⊥	Push down space
═	Straighten
‖	Align type
⁁,	Insert comma
∨'	Insert apostrophe
∨"	Insert quotes
(/)	Insert parentheses
[/]	Insert brackets
⁁3	Insert inferior figure
∨3	Insert superior figure
=/	Hyphen

|em|	Em dash
|en|	En dash
;/	Insert semicolon
:/	Insert colon
⊙	Insert period
?/	Insert question mark
ⓘ?	Query to author
⌢	Use ligature
Ⓢⓟ	Spell out
Tr	Transpose
Set 1, 2, 3	In this order
wf	Wrong font
bf	Set in bold face type
rom	Set in roman type
ital	Set in italic type
Caps	Set in capitals
sc	Set in small capitals
lc	Set in lower case
B̸	Lower-case letter
stet	Let it stand
no ¶	Run in same paragraph
ld>	Insert lead between lines
hr#	Hair space between letters
out sc	Out–see copy
⌗	End of copy

HO 2

WE NEVER MAKE MISTEAKES

Perhaps second only to brain surgery, the printing process is a very exacting business. One misspelling, one misplaced comma, or one transposed number and an entire print job may have to be scrapped.

We have seen many thousand of dollars of printing go to the scrap pile because of a single incorrect digit. In other industries, some salvage is possible. If a slight mistake is made in a garment it can always be sold as a "second". If a defective part is put into an automobile, it is simply replaced. But you can't replace a typo in the middle of a page that has been printed. And nobody is interested in buying "seconds" of somebody else's printing.

Mistakes are costly. Inevitable, time and money must be spent to correct errors. The unfortunate facts are that much of that time and money is spent by the printer because he usually is blamed for the error. Here are suggestions that will save time and money.

---

1. TIME —

Without question, most mistakes are due to the time factor. When errors occur, it's most likely that not enough time was spent during every step of the printing process. The old printing adage, "there is never enough time to do it right . . . but always enough time to do it over", is certainly true. A large part of making sure printing jobs are trouble free, is to convince the client that enough time should be allowed for the printer to produce a printed piece.

2. CLEAN COPY —

Another part of the job is to convince the client that the print work will be error-free if good, clean, legible copy is received. Too often, a poor, illegible manuscript or vague, marginal notes are too difficult to interpret. This causes serious errors, which must be corrected later. The printer must doggedly stay with the client until he is absolutely certain that all instructions are clear and understandable.

3. FOLLOW COPY —

One of the more tragic erros occurs when a printer, in a special effort to assist the client, changes the copy or instructions in a way that makes more sense to him . . . only to find that there was a special reason for the instructions to be followed precisely as submitted. A cardinal rule of typographers is, "follow the copy . . . even if it flies out the window".

4. MARK CORRECTIONS CLEARLY —

"Printers don't make mistakes" so they hate to make corrections. To ease the job, mark corrections clearly, in constrasting ink and large enough to see easily. Proof read the corrections before releasing them to the next station. Three consecutive lines of type make corrections easier for paste-up to align.

**Proofreaders
are
Perfectionists**

5. DOUBLE PROOFREAD —

It has been proven time and time again that having two different people read proofs pays dividends. It's unfortunate that the number of personnel available in a small print shop to check instructions and proofread copy is limited. But because of our varying observation powers, different people can spot different errors.

6. PASTE-UPS SHOULD BE READ —

Just because galley proofs have been read and approved, do not assume that the paste-ups are correct. Paragraphs can be placed in the wrong sequence or corrections marked on the galleys may not be properly made.

---

7. PROOF POSITIVE —

Too frequently one hears a client discussing an impression. It whould be explained to the client that "what he sees is what he gets". A carefull explanation should be given that extreme caution should be taken with the care and handling of the camera-ready art. Inform your client that all corrections or notations should be made on the tissue overlay. A hardnosed approach should be taken to insist that all approved copy bear the initials of a person responsible for the final approval before the printing process begins. Approval should be given, "Ok as is" or "Ok, with corrections". Too frequently one hears a client discussing an imperfect job by saying, "Oh, I saw that error, but it was so obvious, I thought you would correct it".

8. PLAY IT AGAIN —

On reorders of work with some changes that require the paste-ups should be proofread one more time. When paste-ups are stored, strange things can happen. Corrections made on the previous paste-up may have flaked off during storage and the same old mistakes can suddenly recur. Obviously, storing artwork and paste-ups in heavy cardboard jackets in a dry, clean area pays dividends.

9. HANDLE WITH CARE —

Particular care should be taken as paste-up machanicals are passed from one department to the other. Merely removing the paste-up from the jacket or placing the paste-up on the copy board of a camera may be enough to dislodge pieces of copy.

10. GIVE ME PROOF —

The broad variety of proofing processes have one thing in common. They are time consuming and everyone wishes that the procedures could be shortened. However, due to the many ways that a printing job can be produced improperly, every effort should be made to offer a final pro[illegible] . . . be it a blue line, color key, Vem Dyke, or whatever . . . so that a final approval can be given before the presses roll.

11. EVERYONE IN THE ACT —

Printers who successfully produce error-free work on a regular basis have developed an attitude among their personnel that keeps everyone invloved in processing the print order on the lookout for errors that may have occurred. Everyone in the plant should be encouraged to raise questions as to the spelling of a word . . . the correct cut line under a photograph . . . the appropriate folding of the finished piece . . . the final trimming..and on and on. Some printers have successfully used extraordinary means to create an "error-free" attitude. Reqards are given for error-free performance. Signs are erected in the vaious departments indicating the number of error-free days that have occured.

In general, making errors is easy . . . avoiding them is difficult . . . but it certainly pays dividends!

BEST COPY AVAILABLE

ASSIGNMENT SHEET 1 - PROOFREADING COPY

Directions: Proofread the following copy using correct proofreaders' marks and a contrasting pencil.

Dear Johann Gutenberg

There is a rumor circulating among the people connected with the art of Printing. Some say that your great art might be dying. As a famous inventor however you no doubt approve of the many possibilities inherent in today's technolgy encompassing electronic photocomposition and the digital storage of letterforms

Hopefully watching from the printer s Valhalla on the development of your invention, you must still be very proud of your basic conception. In the old city of Mainz you trained your boys by the art and rules of the ancient scribes, enabling them to understand your new craft and to learn its basic principles. Even today the young need such inspired instruction. Hand composition remains the best method of understanding how letters can be arranged with artistic taste and can still serve that fundamental purpose: to tranfer the message of the text properly to the reader.

ASSIGNMENT SHEET 2 - TYPES OF PROOFS

Directions: Write a short paragraph describing each type of proof. Indicate the area or department from which the proof originates; the area or department that would receive a copy of the proof; and the final dispensation of the proof.

1. Galley Proof:

2. Brown Line Proof:

3. Page Proof:

4. Reproduction Proof:

ANSWERS TO ASSIGNMENT SHEET

ASSIGNMENT SHEET 1 - PROOFREADING COPY

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ANSWERS TO ASSIGNMENT SHEET

ASSIGNMENT SHEET 2 - TYPES OF PROOFS

1. Galley: First proof that is read; possible second galley proof; originates in typesetting area; copy could go to layout area for copyfitting; final correct copy should accompany typed copy to paste-up area.
2. Brown Line Proof: Checked against comprehensive layout; originates in paste-up area; copy should go to layout area for approval; final copy should accompany paste-up to camera.
3. Page Proof: Checked against working dummy and paste-up copy; originates in press room; copy should be approved by customer representative; approved proof remains with job ticket.
4. Reproduction Proof: Final approved proof photographed for distribution to other paste-up areas or customers; sometimes called a slick; occasionally a camera-ready proof pulled from hot composition.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

SCOPE OF UNIT:

This unit provides typesetting background information and teaches the skills necessary for typesetting performance. The unit covers the development of typesetting, printers' measurements, type and design, impact and photocomposition, proofreading, word processing, optical character recognition and telecommunication.

INFORMATION TOPIC: III-5 OR DEMONSTRATION:

TYPOGRAPHY
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify symbols used for markup.
2. Identify the guidelines of good typography.
3. Mark up copy to be typeset.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Markup
2. HO 2: Markup Procedure
3. HO 3: Markup Symbols
4. HO 4: General Guidelines for Good Typography
5. HO 5: Designing with Text Type
6. AS 1: Markup Exercise I
7. AS 2: Markup Exercise II
8. Video Tape GA-88-140: Type Composition. Available from The Media Center, State Fair Community College, 1900 Clarendon Rd., Sedalia, MO 65301 (816)826-7100

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, unit 9, p. 23.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Conover, Theodore E. Graphic Communications Today. St. Paul, MN: West Publishing Co., 1985, ch. 4, pp. 63-82.

REFERENCES:

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980.

Struss, Victor. The Printing Industry. Washington, DC: Printing Industries of America, 1967.

Blair, Raymond N., ed. The Lithographer's Manual. 7th ed. Pittsburgh, PA: The Graphic Arts Technical Foundation, 1983.

Pocket Pal. 13th ed. New York, NY: International Paper Co., 1983.

Crow, Wendell C. Communication Graphics. Englewood Cliff, NJ: Prentice-Hall Inc., 1986, ch. 4, pp. 35-56.

INTRODUCTION:

If we cannot get the potential customer to look at the printing, either an advertisement, book, magazine, or newspaper, we have done a poor job of typography. Our job as typographers is to get the potential customer to notice. Typography is often defined as the selection, arrangement of type, and white space that is pleasing to the reader.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

OUTLINE: (Key Points)

I. Markup Symbols (HO 1, HO 2, HO 3)

   A. Symbols - symbols should be clear, concise and easy to read by typesetter

   B. Clarity

      1. Symbols should clear to the operator to prevent delay when setting copy.

      2. They should not be confused with proofreader's marks. Do not place markup symbols on the copy.

   C. Simplicity

      1. It is best to use only those mark-up symbols that are needed.

      2. With experienced operators, repeating the same symbols may be unnecessary.

      3. With new typesetters more markup may be required.

II. Typography Guidelines (HO 4)

   A. Selecting the proper parameters - knowledge of the guidelines is necessary to determine proper selection of parameters

      1. Line length - should be 2-1/2 times the point size

      2. Type style

      3. Point size

      4. Set leading - should be 20% of the point size

   B. Choosing amount of space and margins

      1. Margins and white space are used to attract attention.

      2. Too much space and wide margins lose the eye and add to the cost of the printed product.

3. River - excessive white areas in consecutive lines

C. Numbers - numbers under ten should be spelled out, over ten should be written as numerals

D. Paragraph indention

1. Paragraph indention is generally one en for each eight picas in line length.

2. Should the customer prefer not to indent the paragraph, additional white space should be placed between paragraphs to distinguish new paragraphs.

E. Type styles

1. The selection of the proper type style depends on the purpose of the printed product.

2. General reading or technical information should be in a serif or sans serif style.

3. Styles that are fancy should not be used when a large amount of copy is to be set.

4. Text and script styles should never be set in all capitals.

5. Bold and italic should be used sparingly.

III. Designing with Text Type (HO 5)

A. Aesthetics - the design should have good taste and be pleasing to read

B. Appropriateness - the material must be appropriate to the intended purpose; a layout/type that is fancy is not suited for a heavy construction firm

C. Legibility - copy must be legible; selection of type styles that are hard to read defeat the purpose of the advertisement; such type styles may be used for emphasis but not for the body of the copy

D. Word Spacing

1. Standard word spacing is adequate for most type faces because they have been programmed into the machine by manufacturers who have researched spacing.

2. Copy set in bold type or in all capital letters may require more word spacing.

E. Letter spacing - determined by the type designer; however it can be adjusted by the typesetter for emphasis or copyfitting purposes

F. Line length - dependent upon the size of type used; long line lengths are hard to read

G. Leading

1. With the line length, the leading is also dependent upon the size of type.
2. The larger the size of type, the more leading is required between the lines.

H. Arrangement of type - how the type is set for each line affects the legibility of the copy; modern typesetters can produce many different arrangements:

1. Justified
   a. Most common arrangement
   b. All lines are the same length.
   c. Justified copy is comfortable reading for most people because they are used to it.
   d. Interword space is not uniform.
2. Ragged right
   a. Copy is set typewriter-style with right margin and is not justified.
   b. Word spacing is even throughout the copy.
   c. Hyphenation is not a problem.
3. Ragged left
   a. Left-hand margins are not justified.
   b. The fact that readers are not accustomed to this style makes this less popular.
   c. Good style for emphasis and short amount of copy
4. Centered
   a. All lines of the copy are centered in relation to each other.

b. This is used primarily for invitations and announcements.

c. Lines should not be about the same length; some should be short and some long.

5. Asymmetrical

a. A combination of some or all of the above

b. Used to emphasize certain copy

c. Difficult to read and requires additional leading

IV. Summary and Conclusion

A. Markup symbols

B. Typography guidelines

C. Designing with text type

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

INTERACTION ITEMS:

1. Identify markup symbols and the correct procedure to use them.

2. Identify the guidelines for good typography.

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Given a manuscript, redesign its layout with proper attention to aesthetics, appropriateness, legibility, word spacing, line leading and type arrangement.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

EVALUATION ITEMS:

Circle the letter of the correct answer for each of the following.

1. Markup symbols must be:
   a. Same as proofreaders' marks
   b. In contrasting ink
   c. In left-hand margin only
   d. Clear to operator

2. 9/11 to the typesetter means:
   a. Font 9/leading 11
   b. Font 9/set leading 11
   c. Point 9/line length 11
   d. Font 9/line length 11

3. Set leading should be ____% of the point size.
   a. 10
   b. 20
   c. 25
   d. 5

4. Line length should be about _____ times the point size.
   a. 2-1/2
   b. 5
   c. 4-1/2
   d. None of the above

5. ________ type should never be set in all capitals.
   a. Script/decorative
   b. Script/text
   c. Text/decorative
   d. Italic/bold

6. Paragraph indention should be _____ en for every 8 picas.
   a. 2
   b. 3
   c. 4
   d. 1

7. Excessive white areas in consecutive lines often form a ___.

   a. River
   b. Widow
   c. Lake
   d. Orphan

8. Uniform interword space is not obtained with _____ copy.

   a. Justified
   b. Ragged right
   c. Centered
   d. Ragged left

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

ANSWERS TO EVALUATION ITEMS:

1. d
2. b
3. b
4. a
5. b
6. d
7. a
8. a

Markup

1. Diagnosing the Job
   - Go through entire job first.
   - Can we format the job?
   - Is heavy coding necessary?
   - Do we know the client?
   - Is it a new job or rehandle?
   - Assign an operator who can set it.

2. Choosing the Layout
   - Type Style
     -Do styles exceed machine capacity?
     -Do you have the proper pi characters?
     -Are you matching a special typeface?
     -Do you need a large x-height?

   - Leading
     -Uniform leading throughout the job?
     -Reverse leading?
     -Supplementary leading?
     -Line length?

   - White Space
     -Interword spacing?
     -Letterspacing acceptable?
     -Kerning?
     -Character compensation?
     -Fixed or variable spacing?

   - Fit
     -Hyphenation permitted?
     -Ragged copy (right, left, or center)?
     -Patch corrections, or re-run?
     -How many proofs?
     -Hanging punctuation?

Markup Procedure

When doing a markup, the first task is to learn about the total manuscript. The second task is to study the entire layout. With this data, the markup process can begin.

The markup steps are as follows:

1. Select typefaces.
2. Select type sizes.
3. Decide line length and leading.
4. Decide upon and mark all special needs. Examples are paragraph indention, space between headings and body, italics, and bold face.
5. Give the marked-up copy to the keyboard operator.
6. With the keyboard operator, review the marked-up copy for problems.
7. A good way to learn to do markup is to study some sample work.

Markup Symbols

SYMBOL	MEANING
Helios	Kind of type
X 18	Line length in picas
9/11	Nine-point type with eleven-point leading
F-1	Font 1 (Helvetica light, for example)
P 10	Point size of type
TB	Tab
QL or [	Set copy flush left on margin (quad left)
+ 6 pts	Add 6 points space
QC or][	Set copy in center of margin (quad center)
□	Indent one *em* space
⍁	Indent one *en* space
—	Set in italic
═	Set in small caps
≡	Set in regular caps
〰	Set in bold face
¶	New paragraph
Just.	Set copy margin-to-margin
H̸	Not capital
BLR	Baseline rule
LDR	Leadered line

HO 4

General Guidelines for Typography

1. For the most pleasing appearance, optimum line length should be about two and a one-half times the size of the type. This gives a ten-point type size an average line length of 25 picas.
2. Have leading at least 20 percent of the point size. A ten-point type should have a two-point leading for good appearance.
3. Longer lines will produce better word spacing and reduce the tendency toward rivers.
4. Use traditional typography. The reading public is more comfortable with left and right margin justification for large amounts of reading text.
5. Ornaments should not overpower the type. Bullets, stars, brackets, etc., should not distract from the type style used.
6. Avoid widows (single words on the last line of a paragraph) when typesetting.
7. Avoid orphans (indented paragraphs on the last line of a page or column) when typesetting.
8. Readers prefer reading serif faces if the material is long.
9. Margins should approach 40% of the page area, especially for books.
10. Paragraph indentation should be relative to the line length. One EN for every eight picas is a good measure.
11. White space can be just as effective as rules in guiding the eye.
12. Kerning and tracking can enhance type appearance, especially with larger point sizes.

HO 5

Designing with Text Type

Type Arrangement

- **Justified Type**
  Advantages: Good for sustained reading; comfortable reading
  Disadvantages: Short measure; poor word spacing

- **Ragged Right Type**
  Advantages: Equal word spacing; no rivers; no hyphenation; visual interest

- **Ragged Left Type**
  Advantages: Even word spacing; different; not common to readers
  Disadvantages: Readers not accustomed to style; good for short span of copy only

- **Centered**
  Advantages: Even word spacing; adds dignity to copy
  Disadvantages: Avoid similar line lengths; readers not accustomed to style

- **Asymmetrical**
  Advantages: Even word spacing; used to emphasize copy
  Disadvantages: Distracts reader; requires generous leading

AS 1

ASSIGNMENT SHEET 1 - MARKUP EXERCISE I

Directions: Using the proper markup symbols, mark up the following exercise for typesetting. Use Century type, 10-point, set leading of 12 points and line length of 20 picas.

When Johannes Gutenberg began to print in Mayence more than 500 years ago, it was his great aim to reproduce handwriting by machine. None of the beauty of handwriting was to be lost; otherwise the new art could not have established itself.

In the early days of printing there is frequent mention of the "art of writing mechanically," and in the first printed works we often read that they have been produced without the aid of a scribe's quill pen. As the scribe could only produce one book at a time, and that by long and painstaking work, an edition of 200 seemed enormous. But, once the art of printing began to spread throughout Europe, the number of readers, and thus the demand, also increased so that editions could quickly rise to 1,000 copies.

AS 2

ASSIGNMENT SHEET 2 - MARKUP EXERCISE II

Directions: Mark up the following advertisement to fit a one-column (12-pica) by 3-inch space. If your typesetter has ruling capabilities, place a rule around the advertisement.

Rather Spend Time

Keyboarding?

or

Making Money?

Our reader lets you received information directly from WP or PC diskettes at 960 characters per second, error free!

You can attract and accomplish more business, more profitably.

Let us show you how!

BABER
5 Northern Blvd.
Amherst, NH 03031
(603) 886-1770

ANSWERS TO ASSIGNMENT SHEET 1 - MARKUP EXERCISE I

$\boxed{2}$ When Johannes Gutenberg began to print in Mayence more than 500 years ago, it was his great aim to reproduce handwriting by machine. None of the beauty of handwriting was to be lost; otherwise the new art could not have established itself. ¶ QL

$\boxed{2}$ In the early days of printing there is frequent mention of the F2 "art of writing mechanically," F1 and in the first printed works we often read that they have been produced without the aid of a scribe's quill pen. As the scribe could only produce one book at a time, and that by long and painstaking work, an edition of 200 seemed enormous. QL ¶ $\boxed{2}$ But, once the art of printing began to spread throughout Europe, the number of readers, and thus the demand, also increased so that editions could quickly rise to 1,000 copies. QL

ANSWERS TO ASSIGNMENT SHEET 2 - MARKUP EXERCISE II

12/14 × 12 Univers (or Sans Serif)

+~~8~~ 4 pts.

Rather Spend Time

P14 Keyboarding?

P12 or

P14 Making Money?

Just. 9/10

☐ Our reader lets you received
information directly from WP or
PC diskettes at 960 characters
per second, error free!
You can attract and
accomplish more business,
more profitably.

Let us show you how! +18 pts.

26/12

9/10

BABER
5 Northern Blvd.
Amherst, NH 03031
(603) 886-1770

288

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

SCOPE OF UNIT:

This unit provides typesetting background information and teaches the skills necessary for typesetting performance. The unit covers the development of typesetting, printers' measurements, type and design, impact and photocomposition, proofreading, word processing, optical character recognition and telecommunication.

INFORMATION TOPIC: III-6 OR DEMONSTRATION:

IMPACT TYPESETTING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify reasons for converting to "cold" composition.
2. Identify impact typesetters.
3. Identify characteristics of impact typesetters.
4. Justify copy on impact machine.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. TM 1: Comparison of Mono/Proportional Spacing
2. AS 1: Justifying Copy on an Impact Machine

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, unit 30, pp. 83-90.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch. 6, pp. 107-112.

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 4, pp. 57-61.

REFERENCES:

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 6, pp. 93-94.

Struss, Victor. The Printing Industry. Washington, DC: Printing Industries of America, 1967.

Blair, Raymond N. ed. The Lithographer's Manual. 7th ed. Pittsburgh, PA: The Graphic Arts Technical Foundation, 1983.

Pocket Pal. 13th ed. New York, NY: International Paper Co., 1983.

INTRODUCTION:

The increased demand for reading materials following World War II created the necessity for faster printing methods. The faster, more versatile offset process seemed to be the answer. The new process, however, created a special typesetting problem--"cold composition." Impact typesetting bridged the void from "hot" composition to photocomposition. It was a short but vital period of adjustment to the new process.

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

OUTLINE: (Key Points)

I. Conversion to Impact Typesetters

   A. Cold Composition - conversion to impact typesetter was necessary because of the growing popularity of the planographic printing process

   B. Typed copy - sometimes called "two dimensional", could be pasted in place and photographed faster than three-dimensional (hot composition)

   C. Justification (TM 1)

      1. Mono - typewriter style, uniform spacing between all words of the copy; unjustified lines

      2. Proportional - spacing between all words in one line the same, however, spacing varies from line to line; justified lines

   D. Speed - desire to increase speed of typesetting for faster planographic (offset) process was not accomplished

      1. Typewriter - mono spacing and unjustified copy was not accepted by craftsmen of the day

      2. Impact typesetters - adapted to produce proportional spacing, thus resulting in justified columns; the process required typing each line of type twice and slowing the process

   E. Character quality - quality of the copy was poor because of cloth ribbons

      1. Paste-up problems with copy smearing

      2. Density of corrections

   F. Versatility

      1. Impact typesetters were generally designed for straight-matter composition (newspaper, book or magazine).

        2. They could type 18-point type under certain conditions and do form work but they were very slow.

        3. Line lengths on most machines could not exceed standard typewriter carriage, with half of the carriage for the rough copy and half for justified copy.

II. Keyboards

    A. Counting keyboards - keyboards on which the number of units could be counted and line-ending decisions could be recognized by the operator

    B. Tape-generated keyboard - an impact machine that generated a punched tape instead of immediately-typed copy; advantages were that copy would not have to be retyped if used again, and some tape-generated machines possessed editing capabilities

    C. Blind keyboards - keyboards on which the copy could not be read while typing; locating errors and place of interruption is difficult

III. Impact Machines

    A. Typewriter - most popular impact machine; however, not used regularly as an impact typesetter because of justification and mono spacing limitations

    B. Varityper - most popular impact machine due to variety of type styles; type sizes were limited to six 14-point type and copy had to be typed twice; two styles of type could be used on the machine at the same time

    C. Coxhead composing machine - very similar to the varitype except fewer type styles; looked like a typewriter with a dial on each side just above the keyboard

    D. Lithotype composer - another typewriter-style machine that required two typings to produce justified copy; limited amount of type styles and point sizes from 6-12

    E. Justowriter - tape-generated typesetter

        1. The recorder unit generated a tape while producing typed, unjustified copy for proofreading.

        2. The tape could be edited and then placed in the reproducer where justified impact copy was produced.

3. Speed of machine could be one hundred words per minute because copy did not have to be typed twice

4. The machine possessed limited type styles and point sizes because it was designed for newspaper and book publication.

IV. Summary and Conclusion

A. Conversion to impact typesetters

B. Keyboards

C. Impact machines

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

INTERACTION ITEMS:

1. How was the typewriter improved to become an impact typesetter?
2. Why was the Justowriter so much faster than other impact typesetters?
3. Why did impact typesetters replace linecasters?
4. What paste-up problems were created by impact typesetters?
5. How are corrections made on impact typesetters?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Compare space required for copy:

   Typed with mono spacing

   Type set with proportional spacing

2. Figure out the codes of a tape-generated impact machine; notice that letters which are most frequently used have had fewer holes in tape code.
3. Type with an impact machine that generates a tape and notice that a rough print is also being typed, enabling the operator to see where he/she is.

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

EVALUATION ITEMS:

Circle the letter of the correct answer for each of the following.

1. The impact typesetters were used in the _______ process.

   a. Relief
   b. Planographic
   c. Intaglio
   d. Stencil

2. Impact typesetters were no faster than linecasting machines because ___________.

   a. Justification was automatic
   b. Copy smeared easily
   c. Proofreading
   d. Copy had to be typed twice

3. The carbon ribbon of an impact machine improved _______.

   a. Quality
   b. Speed
   c. Versatility
   d. None of the above

For each of the following, write "T" if the statement is true, or "F" if the statement is false.

____ 4. Impact typesetters were used for the offset process.

____ 5. The tape-generated machines added editing capabilities.

____ 6. Impact typesetters were much faster than hand composition because there was no distribution problem.

____ 7. Type sizes were limited on impact machines.

____ 8. The tape-generated impact typesetter did not have to be typed twice.

____ 9. A blind keyboard is one that doesn't have letters on its keys.

____10. The Varitype had a wide variety of type styles.

____11. The impact typesetting era gave way to the relief process.

____12. The counting keyboard counts each character as it types.

____13. The Coxhead composing machine punched a tape.

____14. Impact typesetting was basically for straight-matter copy.

____15. The typewriter has been in existence longer than linecasters.

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

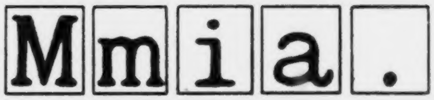
UNIT III : TYPESETTING

ANSWERS TO EVALUATION ITEMS:

1. b
2. d
3. a
4. T
5. T
6. T
7. T
8. T
9. F
10. T
11. F
12. F
13. F
14. T
15. T

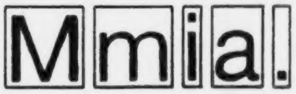
TM 1

Comparison of Mono/Proportional Spacing



MONOSPACING

Typewriter: Characters are all the same width.



PROPORTIONAL SPACING

Typesetting: Characters mostly have different widths.

ASSIGNMENT SHEET 1 - JUSTIFYING COPY ON AN IMPACT MACHINE

Directions: Type the copy below on an impact machine so that the finished product will be justified.

Alois Senefelder is regarded as the "father" of lithography. He is honored by this title through his experimentation in the late 18th century (1796) with a process he called chemical printing. Legend has it that Senefelder's love of writing plays and music led him to experiment with ways of printing his own compositions. He first tried etched copper plates, but the expense of his materials caused him to try using soapstone as an image carrier employing a mixture of wax, soap, and lampblack for the image. He discovered he could put this greasy image on ~~his~~ the stone, dampen it and then ink it to cause it to transfer to paper. This simple process was the forerunner of the popular offset lithography process.

ANSWERS TO ASSIGNMENT SHEET 1 - JUSTIFYING COPY ON AN IMPACT MACHINE

The instructor should evaluate this assignment sheet on an individual basis according to the following criteria:

1. Student typed the copy on an impact machine with a minimum of errors.
2. Copy produced is justified.

LESSON PLAN: 7

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

SCOPE OF UNIT:

This unit provides typesetting background information and teaches the skills necessary for typesetting performance. The unit covers the development of typesetting, printers' measurements, type and design, impact and photocomposition, proofreading word processing, optical character recognition and telecommunication.

INFORMATION TOPIC: III-7 OR DEMONSTRATION:

PHOTOCOMPOSITION

(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify first generation through fourth generation phototypesetters.
2. Identify functions of phototypesetter systems.
3. Identify hyphenation options available on phototypesetters.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Typesetter Generations

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. *Comprehensive Graphic Arts*. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, units 32-34, pp. 90-103.

Spence, Wm. P. and David G. Vequist. *Graphic Reproduction*. Peoria, IL: Charles A. Bennett, 1980, ch. 6, pp. 113-142.

Adams, J. Michael and David D. Faux. *Printing Technology*. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 4, pp. 61-70.

Seybold, John W. *The World of Digital Typesetting*. Medina, PA: Seybold Publications, Inc., 1984, chs. 7-17, pp. 72-297.

REFERENCES:

Walker, John R. *Graphic Arts Fundamentals*. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, pp. 94-96.

Struss, Victor. *The Printing Industry*. Washington, DC: Printing Industries of America, 1967.

Blair, Raymond N., ed. *The Lithographer's Manual*. 7th ed. Pittsburgh, PA: The Graphic Arts Technical Foundation, 1983.

Pocket Pal. 13th ed. New York, NY: International Paper Co., 1983.

INTRODUCTION:

Phototypesetting is advancing in technology at a record pace. Machines become obsolete before they are five years old. Capabilities of these machines become the most important consideration when deciding on new equipment. The new association of typesetters with word processors and computers has provided typesetting with a new and rapidly growing opportunity.

LESSON PLAN: 7

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

OUTLINE: (Key Points)

I. Generations - a technological change in the operation of a phototypesetter

    A. First generation - initial phototypesetting process done on existing linecasting machine theory (HO 1)

        1. Speed - speed was limited to the speed of linecasting machines

        2. Fonts - fonts were limited and had to be changed manually

        3. Type sizes - sizes of type were limited to smaller sizes and also had to be changed manually

    B. Second generation - complete new concept of typesetting using a film negative and a fast exposure source (HO 1)

        1. Strobe light - light that can photograph a moving image as though it was standing still

        2. Speed - speed was limited only by the mechanical capabilities of the machine and it could reach 150 lines per minute

        3. Lines per minute - standardized speed using 9-point type on 11-pica line with 10-point set leading

        4. Fonts - fonts were stored on film (strip, grid, or disk) and photographed by a strobe light

        5. Type sizes - sizes available were not limited and ranged from 3-point to 72-point; sizes could be changed by a command to the machine

    C. Third generation - advanced technology of the second generation, using more electronic parts and fewer mechanical parts (HO 1)

        1. Light source - character was stored photographically or digitally in a cathode ray tube, projected on the screen, and then photographed

2. Speed - speed increase to 850 lines per minute because of electronic process

3. Fonts - basic character for each style could be stored and then manipulated to be italicized, condensed, expanded or handled in other methods

4. Type sizes - the size of the type could also be manipulated from the master; this allowed a greater capability of type styles in the machine

D. Fourth generation - faster technology using the laser and the light source exposure; it has increased the potential of typesetting and has not yet reached its full potential (HO 1)

1. Light source - characters are stored in the cathode ray tube and projected on the screen in blocks of areas (then photographed) using the laser in blocks of areas, not individual character laser

2. Speed - because of the exposure technique, speed has increased 4000 lines per minute

3. Fonts and type sizes - the versatility of the system remains the same as the third generation

4. Pagination - because of the laser exposing areas or blocks of type, the machine has capability of photographing an entire page of copy

II. Keyboarding

A. Entering parameters - commands to the system

1. Line length

2. Point size

3. Type style

4. Set leading

5. Parameters are necessary to begin typesetting.

B. Dedicated keys - keys that have a single command

C. Character management - keys that deal with the management of the character or characters; used primarily for proofreading and editing

D. File management - keys that deal with the manipulation of the copy from the screen or keyboard to the disk or other storage facility

III. Machine Capabilities - capabilities of the system; some systems have more functions that others even though they may be in the same generation

A. Justification process - the process of justifying each line; justification is a counting process which allows all extra space to be added between words

1. Centering - automatically allows each line to be centered on command

2. Ragged right - copy does not have an even margin on the right side

3. Ragged left - copy that does not have an even margin on the left side

B. Ruling options - the option of drawing vertical and horizontal rules for the purpose of building forms

C. Visual viewing - the ability to see the final product prior to its final typesetting

IV. Hyphenation Logic - rules of hyphenation that apply to typesetting

1. Hyphenation on - using the rules built into the machine by the program

2. Hyphenation off - calling off all rules and allowing no hyphenation in the copy

3. Logic rules - the rules that are built into the program

4. Exception word dictionary - words in the logic that do not follow the logic rules

5. Programmable exception word dictionary - words that may be added to the dictionary by the operator

6. Discretionary hyphenation - a dedicated key that indicates to the system where the operator wants the word to be hyphenated

V. Summary and Conclusion

A. Generations

B. Keyboarding

C. Machine capabilities

D. Hyphenation logic

LESSON PLAN: 7

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

INTERACTION ITEMS:

1. Why were first generation phototypesetters basically unsuccessful?
2. Why are disks better for editing than punched tape?
3. Do dedicated keys limit the versatility of the keyboard?
4. What accounts for increased capabilities of the generations?
5. How do hyphenation rules work?
6. How does previewing affect the cost of the typesetting job?
7. What technology will lead to fifth generation typesetters?
8. How do visual aids, such as increased screen size and line endings on the screen, cut costs of typesetting?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Compare tabs on a typewriter to those on a phototypesetter using the basic typewriter style tabs, the floating tab, and the automatic tab.
2. Compare copy run on RC paper with that on S paper in regard to:
    a. Density of the character
    b. Whiteness of paper
    c. Life of the paper and the chemicals
    d. Cost of paper and chemicals

LESSON PLAN: 7

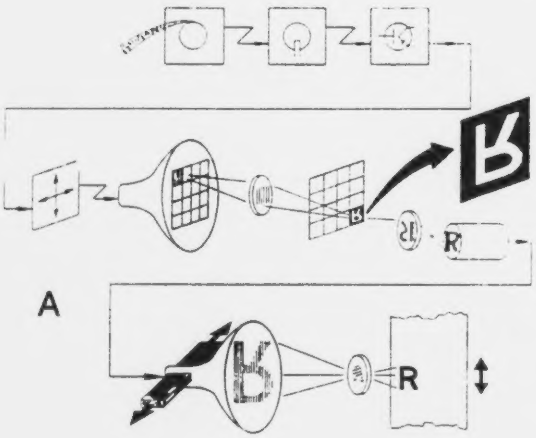
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

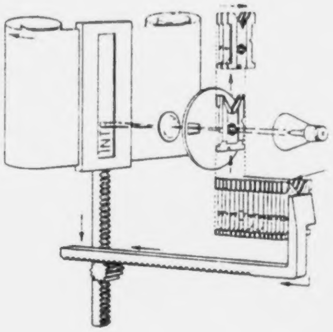
EVALUATION ITEMS:

Write the letter of the illustration in the corresponding blanks.

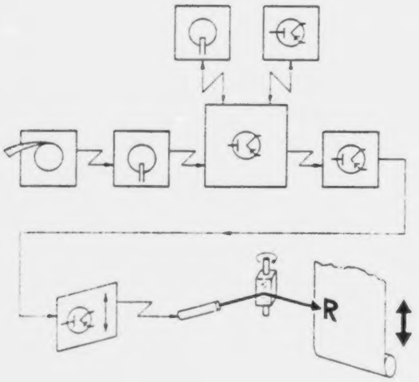
1. ________________ first generation
2. ________________ second generation
3. ________________ third generation
4. ________________ fourth generation



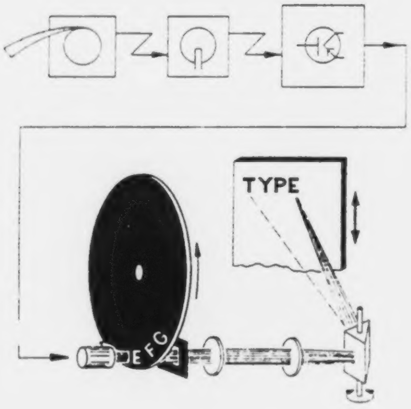
A



B



C



D

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 5. First generation machines were faster than linecasting machines.

____ 6. The character is stored on a font strip in the third generation.

____ 7. Fourth generation phototypesetters used the cathode ray tube to expose the character.

____ 8. More mechanical parts enabled the third generation machines to become faster.

____ 9. Dedicated keys are keyboard keys that have a single primary purpose.

____10. Hyphenation rules are more accurate in third and fourth generation.

____11. Tapes are slower than disks because they have mechanical readers.

____12. Hyphenation rules in the typesetter cannot be manually changed.

____13. Pagination means to typeset copy into pages.

Write the letters of the terms that are considered parameters on typesetters in the blanks provided.

____14.

____15.

____16.

____17.

a. Line length in inches
b. Italic
c. Set size
d. Point size
e. EMS
f. Leading
g. Font
h. Style
i. Set leading
j. Line length in picas

LESSON PLAN: 7

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

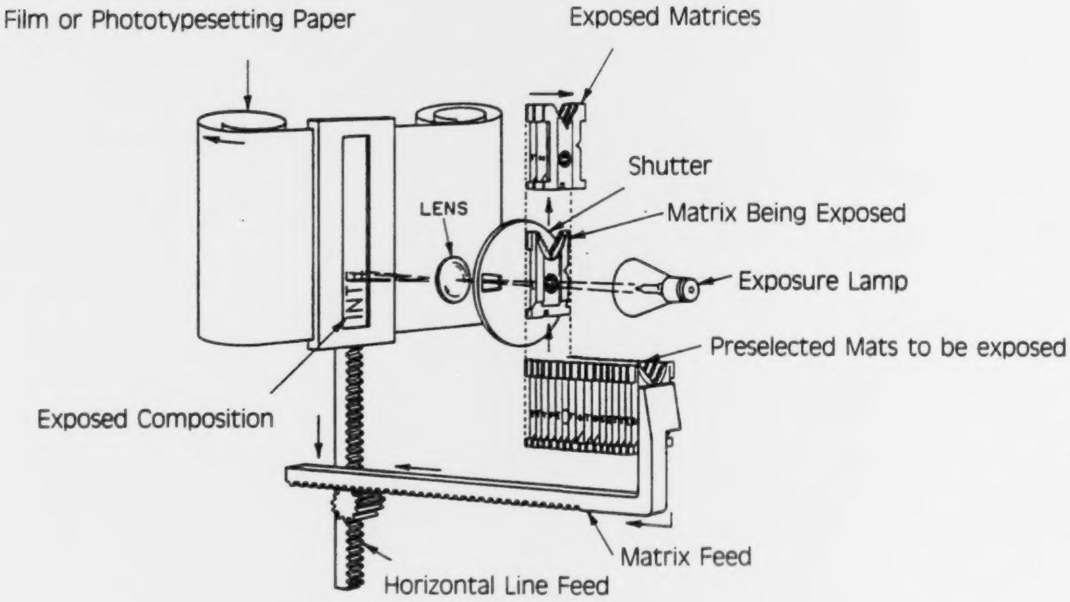
ANSWERS TO EVALUATION ITEMS:

1. B
2. D
3. A
4. C
5. F
6. F
7. F
8. F
9. T
10. T
11. T
12. F
13. T

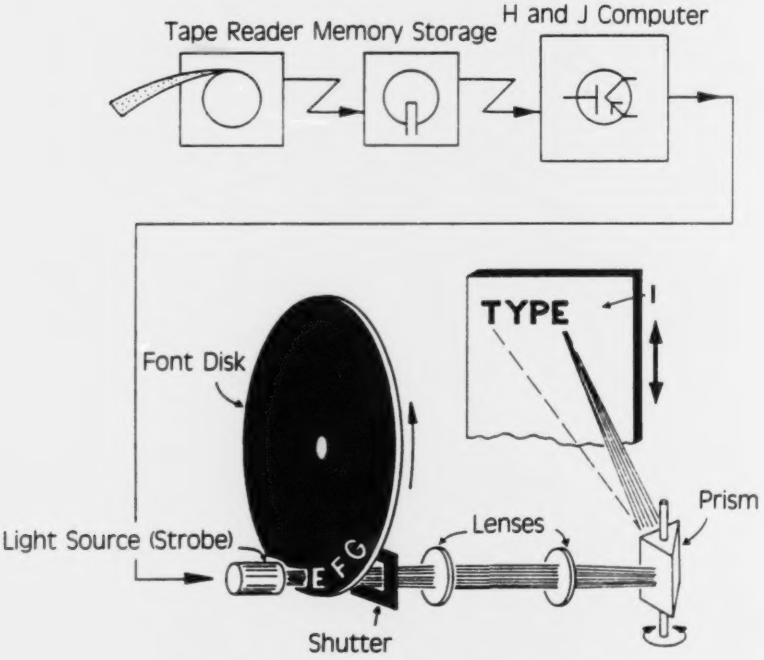
The following can be listed in any order:

14. d
15. h
16. i
17. j

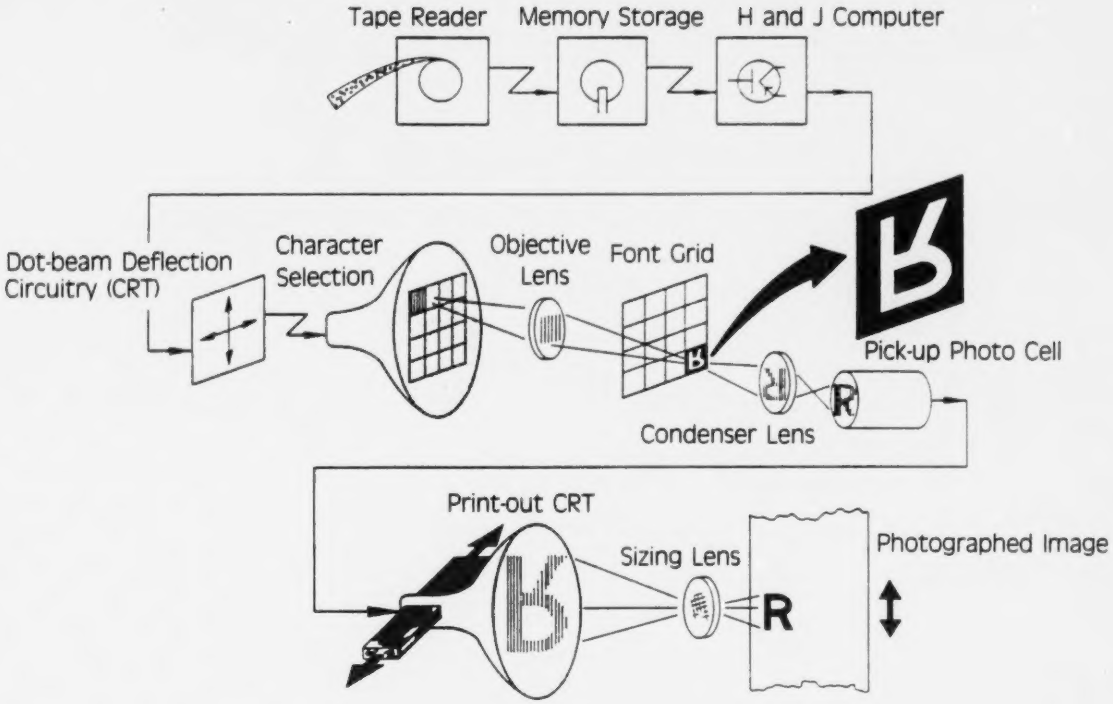
Typesetter Generations


Film or Phototypesetting Paper
Exposed Matrices
Shutter
LENS
Matrix Being Exposed
Exposure Lamp
INT
Preselected Mats to be exposed
Exposed Composition
Matrix Feed
Horizontal Line Feed

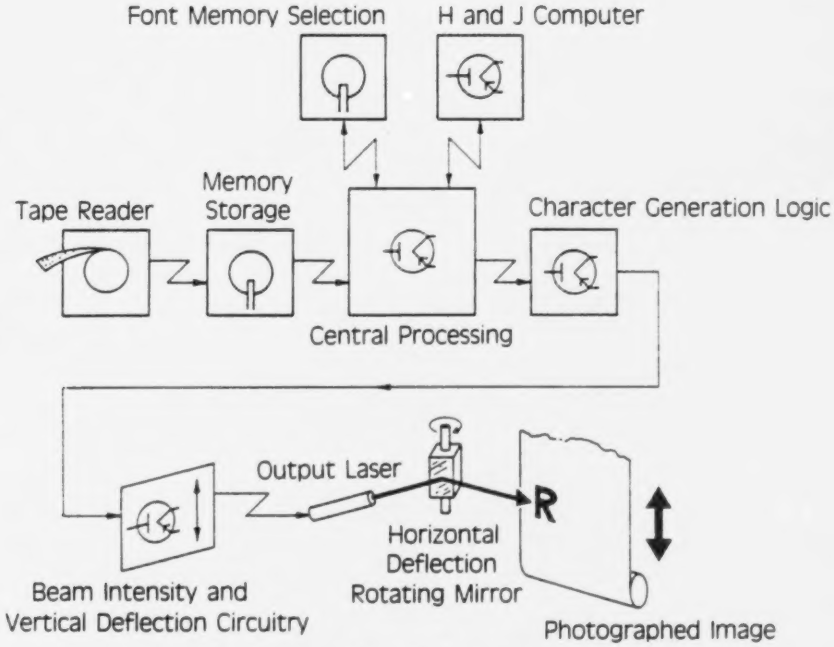
First Generation Typesetter
Phototypesetter


Tape Reader
Memory Storage
H and J Computer
TYPE
Font Disk
Prism
Lenses
Light Source (Strobe)
E F G
Shutter

Second Generation Typesetter
Separate Entry


Tape Reader
Memory Storage
H and J Computer
Dot-beam Deflection Circuitry (CRT)
Character Selection
Objective Lens
Font Grid
Pick-up Photo Cell
Condenser Lens
Print-out CRT
Sizing Lens
Photographed Image
R

**Third Generation Typesetter
Raster-line**


Font Memory Selection
H and J Computer
Memory Storage
Tape Reader
Character Generation Logic
Central Processing
Output Laser
Horizontal Deflection Rotating Mirror
R
Beam Intensity and Vertical Deflection Circuitry
Photographed Image

**Fourth Generation Typesetter
Laser**

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

SCOPE OF UNIT:

This unit provides typesetting background information and teaches the skills necessary for typesetting performance. The unit covers the development of typesetting, printers' measurements, type and design, impact and photocomposition, proofreading, word processing, optical character recognition and telecommunication.

INFORMATION TOPIC: III-8 OR DEMONSTRATION:

TYPESETTING AND PROCESSING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify types of tabulations.
2. Identify types of processing methods available.
3. Set copy requiring command changes and tabs.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Photocomposition Output Alternatives
2. AS 1: Set Copy Using Command Changes and Tabs

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. *Comprehensive Graphic Arts*. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, units 32-34, pp. 90-103.

Spence, Wm. P. and David G. Vequist. *Graphic Reproduction*. Peoria, IL: Charles A. Bennett, 1980, ch. 6, pp. 113-142.

Adams, J. Michael and David D. Faux. *Printing Technology*. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 4, pp. 61-70.

Seybold, John W. *The World of Digital Typesetting*. Medina, PA: Seybold Publications, Inc., 1984, chs. 7-17, pp. 72-297.

REFERENCES:

Walker, John R. *Graphic Arts Fundamentals*. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, pp. 94-96.

INTRODUCTION:

The skill of typesetting comes with the ability to typeset copy other than straight matter. The satisfaction generated from setting complicated copy and producing quality work is great. Knowing and selecting the proper output is based on much more than the knowledge of the typesetter--it's based on skill and satisfaction of doing a good job.

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

OUTLINE: (Key Points)

I. Tabulations

A. Typewriter tabs - tabs that require a definite starting and ending point

B. Floating tabs - tabs where the length of the tabs may be the same, however, the starting point may vary; copy is usually evenly spaced across the sheet

C. Automatic tabs - tabs where the starting point is unknown to the operator; the phototypesetter counts units for the starting point and keeps this information in the memory of the machine

II. Quality Typesetting

A. Correct markup, and proper coding - quality typesetting requires good typography and markup and correct input by the operator

B. No errors - no typographical errors by the operator are an absolute requirement

C. Uniform character density - all characters on the final copy must have the same density to reproduce correctly; weak chemicals in processors are a major cause of inconsistent density; phototypesetters can cause poor density

III. Processing Methods (HO 1)

A. Stabilization paper - a nonpermanent paper on phototypesetters that requires an activator and stabilizer chemical in processing; paper fades and images become weak after a period of exposure to daylight

B. Resin-coated paper - a permanent paper for phototypesetter that requires a developer, fix and wash for processing; paper has long life and is dimensionally stable

C. Film - exposure directly onto film is available, eliminating the paste-up time and camera time of the printing process; more expensive processing and requires adjustments in exposure time on typesetter

D. Plate - exposure directly to plate eliminating steps between paper and plate; requires special processor, however, is ideal for duplicator runs of 5 - 6,000

IV. Summary and Conclusion

A. Tabulations

B. Quality typesetting

C. Processing methods

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

INTERACTION ITEMS:

1. Identify the various types of tabulations: typewriter, floating and automatic tabs.
2. Discuss the various output alternatives and the proper processing method used for each.

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Set copy to specifications using tabs and command changes. Follow instructions concerning line length, line leading and word spacing.

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

EVALUATION ITEMS:

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 1. A typewriter tab requires a point to begin and a point to end copy.

____ 2. The automatic tab begins automatically.

____ 3. Uniform character density requires uniform processing chemicals.

____ 4. Resin-coated paper will fade quicker than stabilization paper.

____ 5. Phototypesetters can expose directly onto a plate.

____ 6. Stabilization paper will replace resin-coated paper because it is more stable.

____ 7. Spacing should be adjusted between lines when the point size changes.

____ 8. A leadered line is distinguished by a series of dashes.

____ 9. The line length must include any gutters in the copy.

____10. Reverse line space means to print copy backwards.

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

ANSWERS TO EVALUATION ITEMS:

1. T
2. F
3. T
4. F
5. T
6. F
7. T
8. F
9. T
10. F

HO 1

Photocomposition Output Alternatives

PAPER

RESIN-COATED

- Lies flat
- Dimensionally stable
- Processes faster
- Less expensive than film

STABILIZATION

- Not permanent
- Needs drying time
- Image fades
- Least expensive material

FILM/PAPER PROCESSOR

- Savings in chemicals
- Replenishment versus replacement

STABILIZATION PROCESSOR

- Low cost
- Daylight operation

FINAL USES OF PRODUCT

Paste-up into paper mechanical
Corrections can be pasted or mortised onto galleys
Proof with electrostatic copiers
Repro proof with PMT material

FILM

FILM/PAPER PROCESSOR

- High quality
- Better size holding
- Easier to proof
- Can be contact printed

REVERSAL FILM PROCESSOR

- 30 to 45% savings in materials
- Produces negative from positive
- High processor cost

USES OF FINAL PRODUCT

Assembly on light table grid into film mechanical
Contact to positive-working plate or film negative
Diazo proofs

PLATE

SPECIAL PLATE PROCESSOR

- Exposed in phototypesetter
- 5M to 6M impressions

USES OF FINAL PRODUCT

Run on offset press or duplicator
Short run

ASSIGNMENT SHEET 1 - SET COPY USING COMMAND CHANGES AND TABS

Directions: Set the following copy in nine-point type with a pica set leading and a line length of 40 picas. Divide the copy into four equal columns with a two-pica gutter between columns. Use reverse leading on each column. Spacing will need to be adjusted on the final column.

Alabama	AL
Alaska	AK
Arizona	AZ
Arkansas	AR
California	CA
Colorado	CO
Connecticut	CT
Delaware	DE
District of Columbia	DC
Florida	FL
Georgia	GA
Hawaii	HI
Idaho	ID
Illinois	IL
Indiana	IN
Iowa	IA
Kansas	KS
Kentucky	KY
Louisiana	LA
Maine	ME
Maryland	MD
Massachusetts	MA
Michigan	MI
Minnesota	MN
Mississippi	MS
Missouri	MO
Montana	MT
Nebraska	NE
Nevada	NV
New Hampshire	NH
New Jersey	NJ
New Mexico	NM
New York	NY
North Carolina	NC
North Dakota	ND
Ohio	OH
Oklahoma	OK
Oregon	OR
Pennsylvania	PA
Rhode Island	RI
South Carolina	SC
South Dakota	SD
Tennessee	TN
Texas	TX
Utah	UT
Vermont	VT
Virginia	VA
Washington	WA
West Virginia	WV
Wisconsin	WI
Wyoming	WY

ANSWERS TO ASSIGNMENT SHEET 1

Alabama	AL
Alaska	AK
Arizona	AZ
Arkansas	AR
California	CA
Colorado	CO
Connecticut	CT
Delaware	DE
District of Columbia	DC
Florida	FL
Georgia	GA
Hawaii	HI
Idaho	ID
Illinois	IL
Indiana	IN
Iowa	IA
Kansas	KS
Kentucky	KY
Louisiana	LA
Maine	ME
Maryland	MD
Massachusetts	MA
Michigan	MI
Minnesota	MN
Mississippi	MS
Missouri	MO
Montana	MT
Nebraska	NE
Nevada	NV
New Hampshire	NH
New Jersey	NJ
New Mexico	NM
New York	NY
North Carolina	NC
North Dakota	ND
Ohio	OH
Oklahoma	OK
Oregon	OR
Pennsylvania	PA
Rhode Island	RI
South Carolina	SC
South Dakota	SD
Tennessee	TN
Texas	TX
Utah	UT
Vermont	VT
Virginia	VA
Washington	WA
West Virginia	WV
Wisconsin	WI
Wyoming	WY

LESSON PLAN: 9

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

SCOPE OF UNIT:

This unit provides typesetting background information and teaches the skills necessary for typesetting performance. The unit covers the development of typesetting, printers' measurements, type and design, impact and photocomposition, proofreading, word processing, optical character recognition and telecommunication.

INFORMATION TOPIC: III-9 OR DEMONSTRATION:

INTERFACING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify input devices.
2. Identify output devices.
3. Identify terminology related to telecommunications.
4. Identify translation tables.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Computer/Typesetting Terminology
2. HO 2: Input/Output Methods
3. HO 3: Methods of Interfacing

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, unit 27, pp. 75-76; unit 30, pp. 86-88.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 4, pp. 63-64.

Seybold, John W. The World of Digital Typesetting. Medina, PA: Seybold Publications, Inc., 1984.

REFERENCES:

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980.

Struss, Victor. The Printing Industry. Washington, DC: Printing Industries of America, 1967.

Blair, Raymond N., ed. The Lithographer's Manual. 7th ed. Pittsburgh, PA: The Graphic Arts Technical Foundation, 1983.

Pocket Pal. 13th ed. New York, NY: International Paper Co., 1983,

Labuz, Ronald. How to Typeset From a Word Processor. New York, NY: R. R. Bowker Co., 1984.

INTRODUCTION:

The feared competitors of photocomposition--word processors and personal computers--have, in the very recent past, become partners with typesetting. This has opened a new world of opportunities for the typesetting industry and greatly expanded its capabilities. These capabilities include compatible equipment in the company, nearby, or across the nation.

LESSON PLAN: 9

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

OUTLINE: (Key Points)

I. Input Devices - devices used to capture the letter enabling it to be manipulated to hard copy (HO 1, HO 2)

   A. Typewriter - the oldest and most popular typesetting device, and with modern technology, becoming much more sophisticated; most typewriters are mono spaced

   B. Keyboards - keyboards are of standard typewriter layout with auxiliary keys and functions to make system user-friendly; keyboards will generate hard copy, punched tape or disk.

      1. Direct-entry - keyboard systems which have no storage or editing systems; strike a key, get a letter

      2. Separate-entry - copy is stored, can be edited and used later to output as hard copy; a cluster of these keyboards can operate a single phototypesetting unit

   C. Optical character readers - a device (OCR) that optically reads copy, translates it into impulses and back to letters; the system is limited to reading typewriter copy with very stringent guidelines; copy can be manipulated after the OCR has captured the copy

   D. Word processing - a method of capturing keystrokes and storing them for later use or editing

      1. Customer advantage - the customer pays for the keyboarding as system is generally in customer's facility; the copy has been proofread before going to printer; customer does not have to pay for keyboard and proofreading by printer, and receives neater and better quality than typewriter product

      2. Printer advantage - the printer can turn the job around in much less time; enlarges his/her market and reduces the number of keyboard operators he/she employs

II. Output Devices - devices that produce a printed product (HO 2)

   A. Printers - a lower quality system of given printed copy that is better than typewriter and poorer than photocomposition

      1. Dot matrix - a printer that produces hard copy by the use of a series of small dots assembled into a character

      2. Laser - a printer that produces a better hard copy with the use of a laser; the product is better and the system is much faster and more versatile

   B. Telecommunications - sending copy over communication lines to a distant station for typesetting; used frequently in book and especially magazine publication

      1. Modem - device that is capable of converting and interpreting signals received through telephone lines

      2. Protocol - the rules and parameters that govern the exchange of information between computers

      3. Satellite keyboarding - keyboarding by terminals that are connected to computer only through telecommunications

      4. Cottage labor - keyboard operators who operate as satellite stations and are paid only for the time that they do keyboarding

   C. Hard disk - a magnetic disk permanently encased in hard material

III. Translation Tables - specific codes that are programmed into a system to receive the various input copy and change the command (HO 3) to that which is acceptable to a photocomposition unit

   A. Delimiter - a code used in constructing translation tables which signals the beginning or end of a single translation

   B. Parity - a system used to detect errors in data transmission

IV. Summary and Conclusion

  A. Input devices
  B. Output devices
  C. Translation tables

LESSON PLAN: 9

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

INTERACTION ITEMS:

1. What do we accomplish when we use word processors for typesetting?

2. As input devices get better, how do they increase their output capabilities?

3. Is capturing and storing keystrokes enough?

4. Why have optical character readers not had as much impact on the typesetting market as word processors?

5. Why must modems have a speed compatible to the typesetter?

6. Where will the typesetting industry be in another five years?

7. Is there a real threat between computers and typesetters?

CLASSROOM, LABORATORY, OR OTHER ACTIVITIES:

1. Compare the quality of output devices.

2. Visit a grocery store or department store that uses optical character readers to read prices and inventory information on products. Using this principle, apply the translation of characters into signals and recapture them as characters.

3. Compare the same copy that has been typed on a typewriter, set on a typesetter and photographed on typesetting paper, and copy that has been outputted to a printer. Check the speed of the operation, quality of the copy and the amount of space required by the three processes. What advantages does each process have?

LESSON PLAN: 9

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

EVALUATION ITEMS:

Match the correct word with its definition.

a. Modem
b. Protocol
c. Delimiter
d. Parity
e. Input devices
f. Cottage labor
g. Telecommunications
h. Output devices
i. Interfacing
j. Translation tables

____ 1. A device that allows information to be shared between two computerized machines

____ 2. A system used to detect errors in data transmission

____ 3. Keyboards that gather information

____ 4. Rules and parameters that govern exchange of information

____ 5. The sending of information over telephone lines

____ 6. Paying only for typesetting work done

____ 7. A code used in constructing translation tables which signals the beginning or end of a single translation

____ 8. Systems that produce printer copy

____ 9. Codes that change codes from one system to codes used by another system

____10. The ability of a machine to work with a different machine

LESSON PLAN: 9

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT III : TYPESETTING

ANSWERS TO EVALUATION ITEMS:

1. a
2. d
3. e
4. b
5. g
6. f
7. c
8. h
9. j
10. i

HO 1

COMPUTER/TYPESETTING TERMINOLOGY

Analog - computerized signals that vary continuously over time

Asynchronous transmission - data transmission that is not regulated by a timing source; beginning and end of blocks of data are signaled by start and stop bits

Binary - a numbering system with a base of two, which uses only the digits 0 and 1

Bisynchronous transmission - a shorthand term for binary synchronous; usually referred to as synchronous

Bit - abbreviation of binary digit, either 0 or 1

Byte - a group of bits (usually 8) representing a character

Conversion - converts information stored on one media to another; for instance, from magnetic cartridges to magnetic diskettes

Delimiter - a code used in constructing translation tables; signals the beginning or the end of a single translation

Digital - information that is coded in binary numerics

Double density - floppy disks that are able to store double the amount of data as single density disks

Dual disk drive - two disk drive capability in a computer; makes editing and back-up much easier when word processing

Duplex - modems that are capable of both sending and receiving information at the same time

Simplex - a modem that either sends or receives information but cannot do both during one transmission

Electronic manuscript - a document sent to a typesetter or printer in electronic, rather than paper form

Front-end system - a minicomputer programmed to control typesetting terminals and output units

Hard disk - a magnetic disk permanently encased in a hard material

Interface - any hardware or software device that allows information to be shared between two computerized machines; indirect interfacing methods include optical character recognition and media conversion; direct interfacing methods are hardwiring and telecommunications

Modem - a device that is capable of converting and interpreting signals received through telephone lines

Parity - a system used to detect errors in data transmissions

Protocols - the rules and parameters that govern the exchange of information between computer

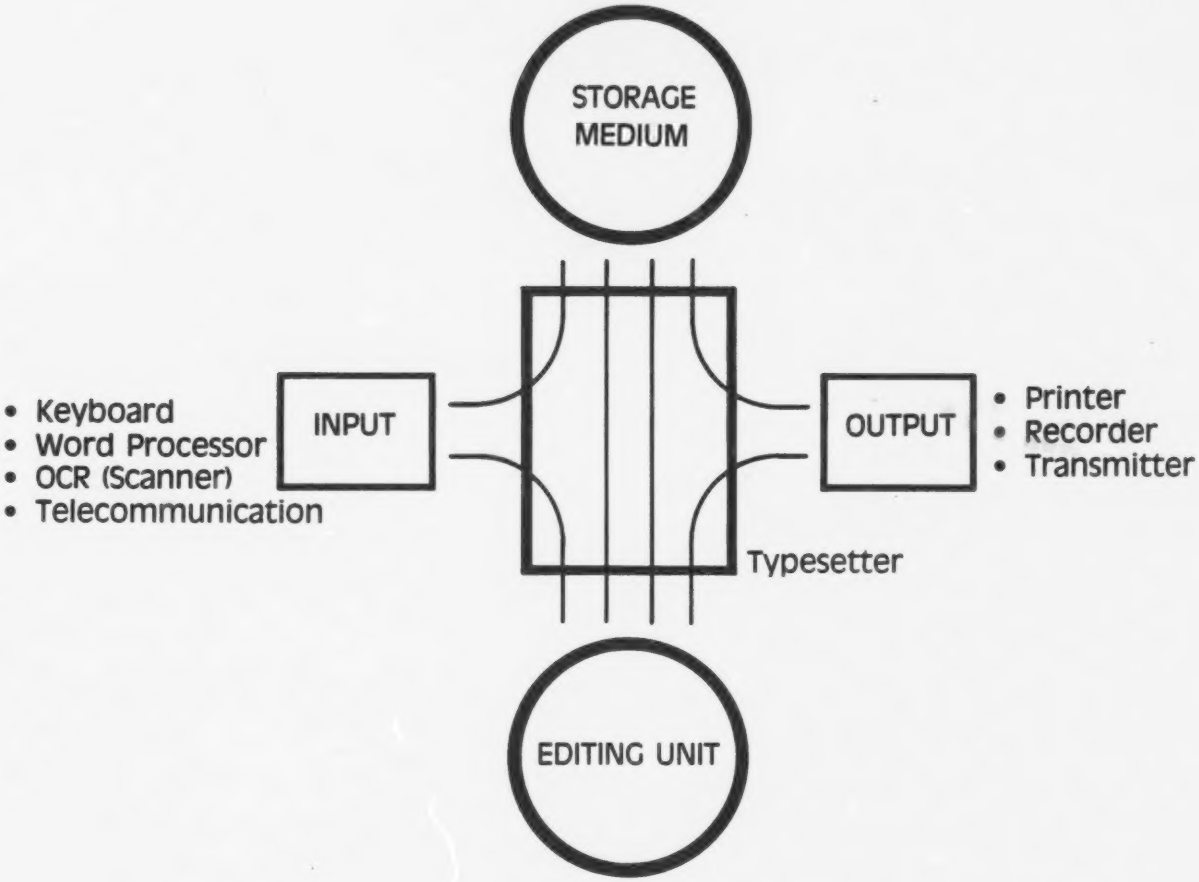
RAM - random access memory; memory that can be changed by the user

ROM - read-only memory; memory that can only be read, and not changed, by the user

Satellite keyboarding - keyboarding by terminals that are connected to the computer only through telecommunications

HO 2

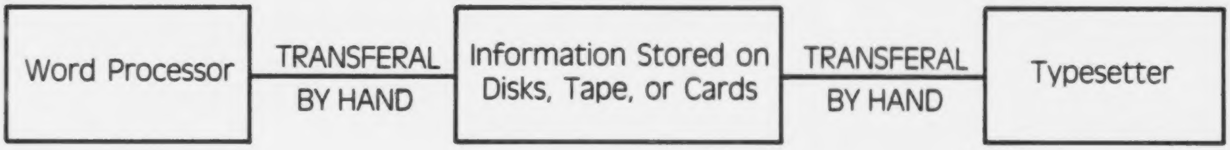
Input/Output Methods


STORAGE MEDIUM
• Keyboard
• Word Processor
• OCR (Scanner)
• Telecommunication
INPUT
OUTPUT
• Printer
• Recorder
• Transmitter
Typesetter
EDITING UNIT

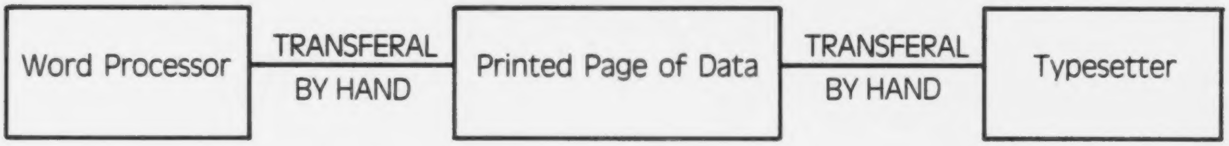
The computer acts as an electronic "traffic cop," directing data to various parts of the system. File lengths may be **fixed**, with only a certain number of characters, or **variable**, with almost any number of characters.

Methods of Interfacing

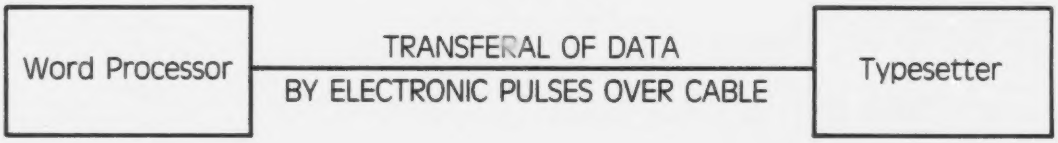
Stored Data


Word Processor
TRANSFERAL BY HAND
Information Stored on Disks, Tape, or Cards
TRANSFERAL BY HAND
Typesetter

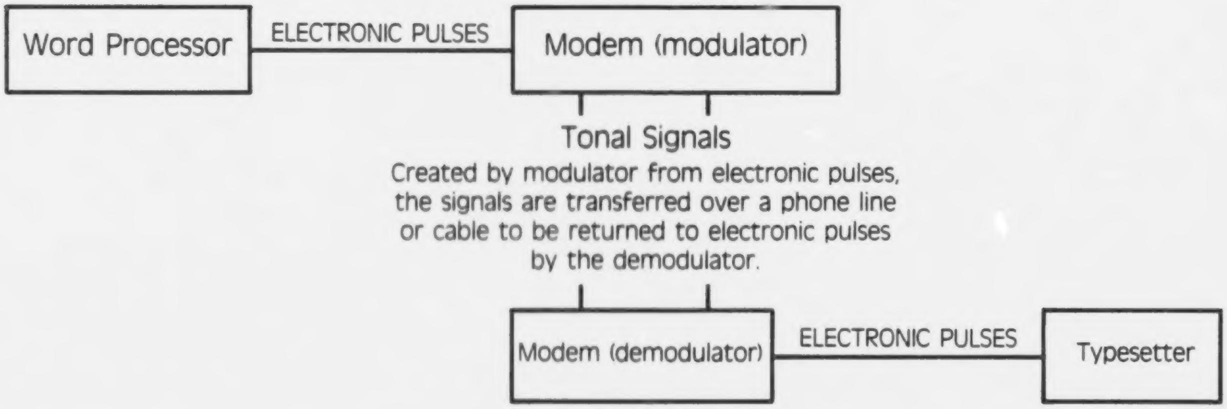
Optical Character Recognition (OCR-Scanner)


Word Processor
TRANSFERAL BY HAND
Printed Page of Data
TRANSFERAL BY HAND
Typesetter

Hardwiring


Word Processor
TRANSFERAL OF DATA BY ELECTRONIC PULSES OVER CABLE
Typesetter

Telecommunications (Modems)


Word Processor
ELECTRONIC PULSES
Modem (modulator)
Tonal Signals
Modem (demodulator)
ELECTRONIC PULSES
Typesetter

Created by modulator from electronic pulses, the signals are transferred over a phone line or cable to be returned to electronic pulses by the demodulator.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

SCOPE OF UNIT:

The importance of using proper paste-up procedures cannot be overemphasized. Paste-up is the stage of production where every element is placed into position. If the element (type, illustration, etc.) is cracked or improperly positioned, the resulting job will also be cracked with improperly positioned elements.

INFORMATION TOPIC: IV-1 OR DEMONSTRATION:

PASTE-UP PROCEDURES, TOOLS AND MATERIALS
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Name four purposes of paste-ups.
2. Name three kinds of paste-up copy.
3. Differentiate between continuous-tone copy and paste-up copy.
4. Describe register marks and their proper use.
5. Describe three major ways ruling on paste-ups is accomplished.
6. Identify the typical tools used in paste-up.
7. List three methods of scaling.
8. State two purposes of cropping photographs.
9. State the purpose of using hand-cut ruby or amber film.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Terms and Definitions
2. HO 2: Paste-Up Equipment
3. HO 3: Paste-Up Tools
4. HO 4: Paste-Up Supplies
5. HO 5: Registration

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 6, p. 117.

REFERENCES:

Crow, Wendell C. Communication Graphics. Englewood Cliffs, NJ: Prentice-Hall Inc., 1986. ch. 20.

INTRODUCTION:

General knowledge of purposes, procedures, tools, materials and equipment is important in the introduction of paste-up to the beginner. Too often, a lack of this knowledge leads to carelessness and sloppiness; this translates into poor quality printing. The importance of the paste-up step in printing cannot be overemphasized.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

OUTLINE: (Key Points)

I. Purposes

  A. Organize all elements of the job on one or more base sheets

  B. Easier to position elements when working with positive prints rather than small pieces of film

  C. Provides method to register multicolor work before it is photographed

  D. Provides artist, customer, etc., a way to see the job and compare to layout before photographing

II. Definitions (See HO 1 for additional terms and definitions)

  A. Paste-up (verb) is a process used to assemble all image areas or elements on a base sheet in the desired position of the finished job.

  B. Paste-up (noun) is a completed assembly of all image areas or elements positioned on a base sheet. Mechanical art is another term for paste-up. It will be the camera copy.

III. Camera Copy

  NOTE: Paste-ups are composed of combinations of the following

  A. Line copy

    1. Type

      a. Display and text type from a phototypesetting machine; this is in the form of a photographic print

      b. Free-hand lettering

      c. Lettering machine product

      d. Clip art lettering

      e. Transfer or rub-down lettering

            - f. Strike-on (typewriter) composition
            - g. Reproduction proofs ("repros") of hot metal or relief-type
        - 2. Illustrations
            - a. Line drawings
            - b. Clip art designs and drawing
            - c. Prescreened photos and art
        - 3. Other paste-up (camera) line copy
            - a. Border and ruling tapes
            - b. Pen and ink rulings
            - c. Transfer screen tints and shadings
    - B. Halftone copy - copy from which halftones must be shot (See Units V and VI)
        - 1. Photographs
        - 2. Paintings
        - 3. Wash and pencil drawings
        - 4. Airbrush renderings

IV. Tools and Equipment for Paste-Up

- A. Equipment (HO 2)
    - 1. Drawing table
        - a. Adjustable, tilting
        - b. Rigid
        - c. Drawing board
    - 2. Light table or light box
    - 3. Tool organizer
    - 4. Adjustable lamp
    - 5. Waxer

B. Tools (HO 3)

1. T-square
2. Triangles - transparent or steel
    a. 30° - 60° - 90°
    b. 45° - 45° - 90°
    c. Adjustable
3. Blue pencil - nonreproducing
4. Knife
    a. Exacto style
    b. Razor blade
    c. Adjustable
    d. Swivel
5. Bow compass
6. Circle cutter, large and small
7. Divider
8. Ruler, stainless steel etched
9. Burnishing roller
10. Burnisher tool
11. Sable brush(es)
12. Cutting board
13. Technical pens or ruling pen
14. Rubber cement dispenser with applicator
15. Scissors
16. Erasers
17. Pencils
18. Fine line ball-point pen, black
19. Type gauge

20. French curve, adjustable curve
21. Circle and ellipse templates
22. Proportion scale

C. Supplies (HO 4)

1. Illustration board
2. Clear film
3. Cover tissue
4. Rubber cement and thinner
5. Masking tape
6. Clear tape
7. India ink
8. Border tapes
9. Shading and tint films
10. Opaque white
11. Ruby and/or amber cut-and-peel film
12. Register marks
13. Dry transfer type
14. Register tabs and buttons

V. Methods of Registration (HO 5)

A. Register marks

1. Small bull's-eye like patterns that may be placed on artwork to help position film negatives in the stripping (film assembly) process; each negative is aligned with another using these guides; available in transparent and opaque positive form on pressure sensitive tape

2. These register marks may be placed on overlay of paste-ups as duplicates on which to align copy, or they may be used on paste-up boards.

   (NOTE: Placement of these marks depends somewhat on shop practice. Many camera persons would prefer to have marks on the base art only and pick up those marks when shooting the overlay flap. The type of job and its complexity dictates this practice.)

B. Pin register system

  1. Common and accurate way of registering multiple exposures, especially when there are many overlay flaps

  2. Use tabs, buttons, and pins; buttons and tabs are most common for registering overlays in paste-up.

  3. Overlay cells may have prepunched holes to fit over pins or buttons.

  4. Pin system can be carried through camera, stripping and platemaking operations for accurate registration. (See Units VIII and IX for pin registration techniques.)

VI. Ruling Copy

A. Machine composition

  1. Phototypesetter

  2. Strike-on typesetting

B. Pen and ink

  1. Ruling lines on repro paper; paste-up on flat

  2. Ruling on flat

  3. Combine ruling with type, or rule on overlay

  4. Ruling pen or technical pen

  5. Variety of widths

  6. Rule Vorger lines and trim to length

C. Scribing lines on film (See Unit VIII)

D. Border and ruling tapes

  1. Self-adhering on rolls

  2. Wide variety to choose from

  3. Miter corners

  4. Corners available

E. Clip art and/or dry transfer borders and rules

F. Use templates or compass to make round corners

VII. Scaling Methods*

A. Proportional scale method - a tool-assisted method of determining percent of enlargement or reduction by lining up size of original (width or height) on inner circle with desired reproduction size (width or height) on outer circle on the proportion scale or wheel

B. Diagonal line method - a graphic method of determining dimensions of a desired enlargement or reduction through the use of baselines, diagonals, and intersecting points drawn on a mock-up of the original or tissue overlay

C. Mathematical method - a computational method of determining percent of copy reduction or enlargement using a formula:

$$100 \times \frac{\text{reproduction size}}{\text{copy size}} = \% \text{ of enlargement/reduction}$$

*Lesson 3 of this unit demonstrates each method and provides a more detailed explanation.

VIII. Cropping Photographs - purposes

A. To eliminate unnecessary portions of the picture

B. To improve or emphasize the desired portion of the picture

IX. Hand-Cut Ruby or Amber Film*

A. Available in two colors

1. Ruby - dark red

2. Amber - deep yellow

B. Used to eliminate unwanted portions of a photo or illustration without damaging original

C. When photographed, ruby or amber film reproduces as black, resulting in clear area on film negative

*Lesson 4 of this unit demonstrates use of hand-cut ruby or amber film in greater detail.

X. Imposition (See Unit I)

   A. One side

   B. Sheetwise (work and back)

   C. Work and turn

   D. Work and flop

XI. Summary and Conclusion

   A. Purposes

   B. Definitions

   C. Camera copy

   D. Tools and equipment for paste-up

   E. Methods of registration

   F. Ruling copy

   G. Scaling methods

   H. Cropping photographs

   I. Hand-cut ruby or amber film

   J. Imposition

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

INTERACTION ITEMS:

1. Why don't we just shoot all of the elements of the job on film instead of combining them on a paste-up first?

2. What kind of elements might you find on a paste-up?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Students should collect all kinds of copy that will need to be photographed. Discuss with students ways each kind of copy can be treated to produce an effective paste-up.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

EVALUATION ITEMS:

1. Name four purposes of a paste-up.

   a.

   b.

   c.

   d.

2. Name three kinds of type copy that may be used on a paste-up.

   a.

   b.

   c.

3. What is continuous-tone copy?

4. What is the purpose of register marks?

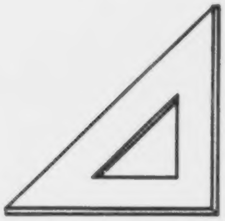
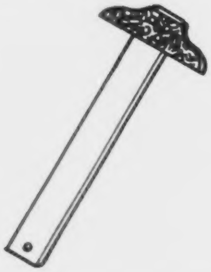
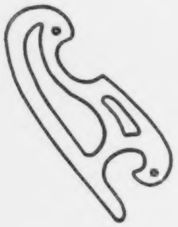
5. Name three major ways that ruling can be accomplished.

   a.

   b.

   c.

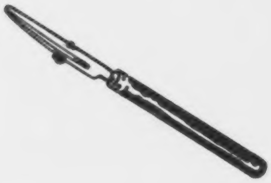
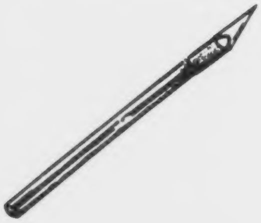
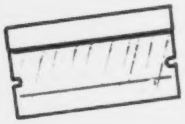
6. Tool identification: Write the proper name in each blank next to the tool illustration.

a. ____________

b. ____________

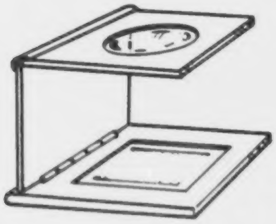
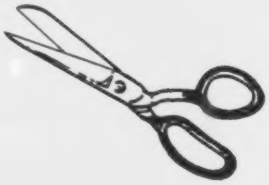
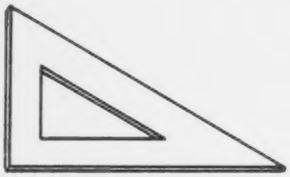
c. ____________

d. ____________

e. ____________

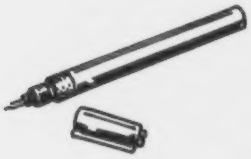
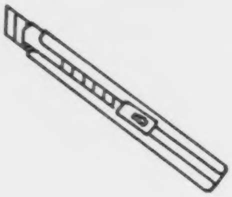
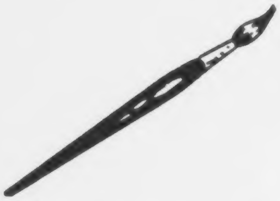
f. ____________

g. ____________

h. ____________

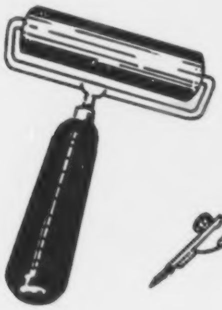
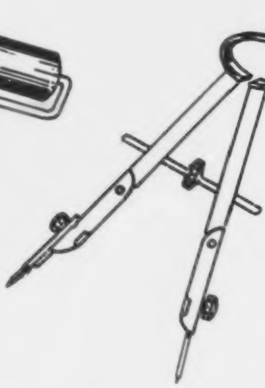
i. ____________

j. ____________

k. ____________

l. ____________

m. ____________

n. ____________

o. ____________

7. Match the terms on the right with the correct definitions.

____ a. Assembly of image areas on a base sheet

____ b. Wax, rubber cement, masking tape, or spray adhesive used to hold copy to base sheet

____ c. Copy which is ready to be photographed

____ d. Table with frosted glass top and light beneath glass

____ e. Image lines and areas of a single density

____ f. Image containing gradations or variations of tone

____ g. A circular slide rule used to find the percentage of reduction or enlargement of copy

____ h. A print made of copy in which the colors are the opposite of the original

____ i. An overprint in which line copy is superimposed over a halftone

____ j. To group together two or more jobs on a single press run

____ k. A print, the same size as the negative, made on a photo-sensitive paper

____ l. To mark an illustration or photograph to indicate what portion of it is to be copied

____ m. A sheet of acetate, tracing paper, or similar material placed over a paste-up to hold copy that will appear in another color or for special instructions on the job

____ n. The arrangement of pages in the proper order on the press sheet

1. Proportional scale
2. Crop
3. Signature
4. Surprint
5. Trail edge
6. Light table
7. Ganging
8. Overlay
9. Mechanical
10. Line copy
11. Contact print
12. Camera-ready copy
13. Scaling
14. Adhesives
15. Imposition
16. Gripper
17. Continuous-tone copy
18. Bleed
19. Reverse
20. Dropout
21. Keyline art
22. Windows
23. Hand-cut ruby film

____ o. A term indicating that certain areas of a photo or illustration are to be left blank, or unprinted

____ p. Determination of proportional dimensions of artwork or photographs when they are reduced or enlarged

____ q. Metal fingers on a press which hold the sheet in position while it is being printed

____ r. The edge of the press sheet that is printed last

____ s. The image, when printed or trimmed, is designed to run off the edge of the sheet

____ t. A printed sheet containing a number of pages, usually 4, 8, 16, or 32, that is folded, and bound in book form

____ u. A masking material which is a separate two-ply acetate film, usually ruby-red film adhered to a clear film base

____ v. Artwork which is prepared for multiple color printing in which the colors overlap slightly

____ w. Transparent openings in film line negatives into which halftone negatives are stripped

8. List three methods of scaling.

   a.

   b.

   c.

9. State the purposes for cropping a photograph.

   a.

   b.

10. State the purpose of using hand-cut ruby or amber film.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

ANSWERS TO EVALUATION ITEMS:

1. a. Organizes all elements on one base sheet
   b. Easier to position positive prints than small film elements
   c. Provides method to register multicolor work
   d. Serves as a customer proof to compare to artist's layout

2. Student may list any three of the following examples.

   a. Type
   b. Illustrations
   c. Prescreened photos and art
   d. Border and ruling tape
   e. Pen and ink drawings and ruling
   f. Transfer screen tints

3. Continuous-tone copy is copy that has tones or shades between black and white. Such illustrations as photographs, paintings, wash and pencil drawings, and airbrush work are usually continuous-tone in nature. Continuous-tone copy is not normally part of the paste-up, but is considered in the paste-up process.

4. Register marks are small line targets that assist the stripper in assembling the negatives made from the paste-up.

5. The student may list any three of the following examples

   a. Pen (ruling or technical) with india ink
   b. Border and ruling tapes
   c. Typesetting machines
   d. Clip art and/or dry transfer borders and ruling

6. a. 45° triangle
   b. T-square
   c. French curve
   d. Ruling pen
   e. Graphic knife
   f. Razor blade
   g. Linen tester (lupe)
   h. Scissors
   i. 30° x 60° x 90° triangle
   j. Technical pen
   k. Art knife
   l. Brush

m. Burnishing roller
n. Compass
o. Divider

7. a. 9
b. 14
c. 12
d. 6
e. 10
f. 17
g. 1
h. 19
i. 4
j. 7
k. 11
l. 2
m. 8
n. 15
o. 20
p. 13
q. 16
r. 5
s. 18
t. 3
u. 23
v. 21
w. 22

8. a. Proportional scale method
b. Diagonal line method
c. Mathematical method

9. a. Eliminates unnecessary portions of picture
b. Improves or emphasizes desired portion of picture

10. Ruby and amber film are used to eliminate unwanted portions of a photo or illustration without damaging the original. When photographed, ruby or amber film reproduces as black, resulting in a clear area on the film negative.

HO 1

Terms and Definitions

1. Adhesives - Wax, rubber cement, masking tape, or spray adhesive used to hold copy to base sheet
2. Bleed - The image, when printed or trimmed, is designed to run off the edge of the sheet
3. Camera-ready copy - Copy which is ready to be photographed
4. Contact print - A print, the same size as the negative, made on a photo-sensitive paper
5. Continuous-tone copy - Image containing gradations or variations of tone
6. Crop - To mark an illustration or photograph to indicate what portion of it is to be copied
7. Dropout - A term indicating that certain areas of a photo or illustration are to be left blank, or unprinted
8. Ganging - To group together two or more jobs on a single press run
9. Gripper - Metal fingers on a press which hold the sheet in position while it is being printed
10. Hand-cut ruby film - A masking material which is a separate two-ply acetate film, usually ruby-red film adhered to a clear film base
11. Imposition - The arrangement of pages in the proper order on the press sheet
12. Keyline art - Artwork which is prepared for multiple color printing in which the colors overlap slightly
13. Light table - Table with frosted glass top and light beneath glass
14. Line copy - Image lines and areas of a single density
15. Mechanical - Assembly of image areas on a base sheet
16. Overlay - A sheet of acetate, tracing paper, or similar material placed over a paste-up to hold copy that will appear in another color or for special instructions on the job
17. Proportional scale - A circular slide rule used to find the percentage of reduction or enlargement of copy

18. Reverse - A print made of copy in which the colors are the opposite of the original

19. Scaling - Determination of proportional dimensions of artwork or photographs when they are reduced or enlarged

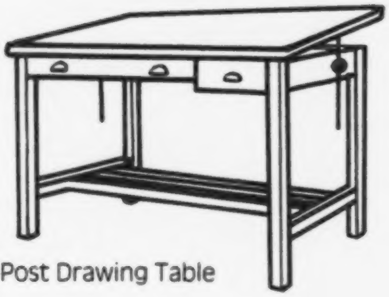
20. Signature - A printed sheet containing a number of pages, usually 4, 8, 16, or 32, that is folded, and bound in book form

21. Surprint - An overprint in which line copy is superimposed over a halftone

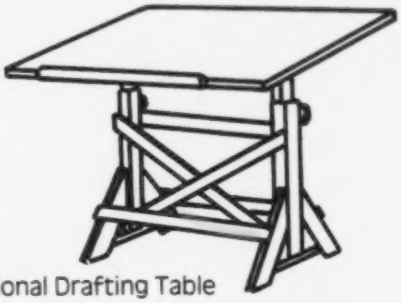
22. Trail edge - The edge of the press sheet that is printed last

23. Windows - Transparent openings in film line negatives into which halftone negatives are stripped

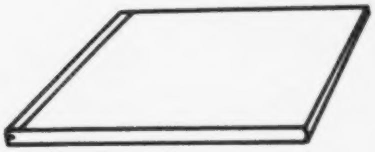
Paste-Up Equipment



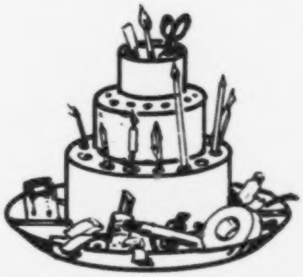
Four-Post Drawing Table



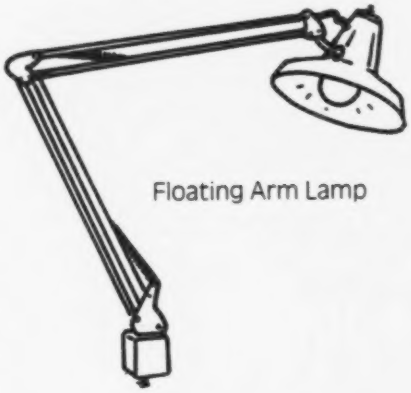
Professional Drafting Table



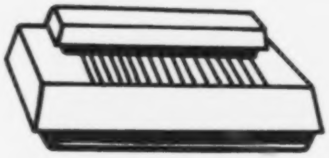
Drawing Board with True-Edge



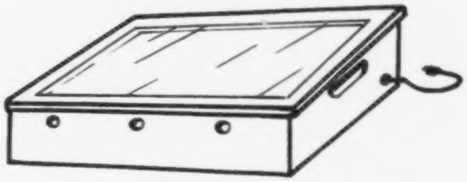
Pencil Holder for Organizing Paste-Up Tools



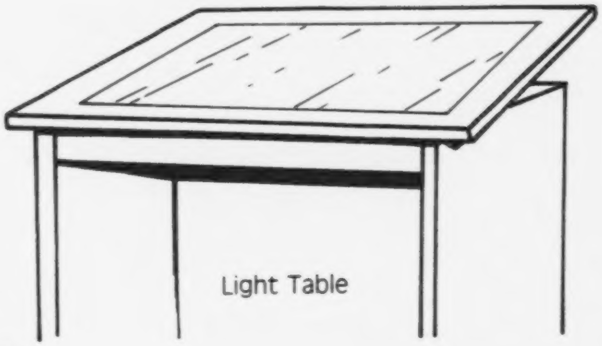
Floating Arm Lamp



Waxer



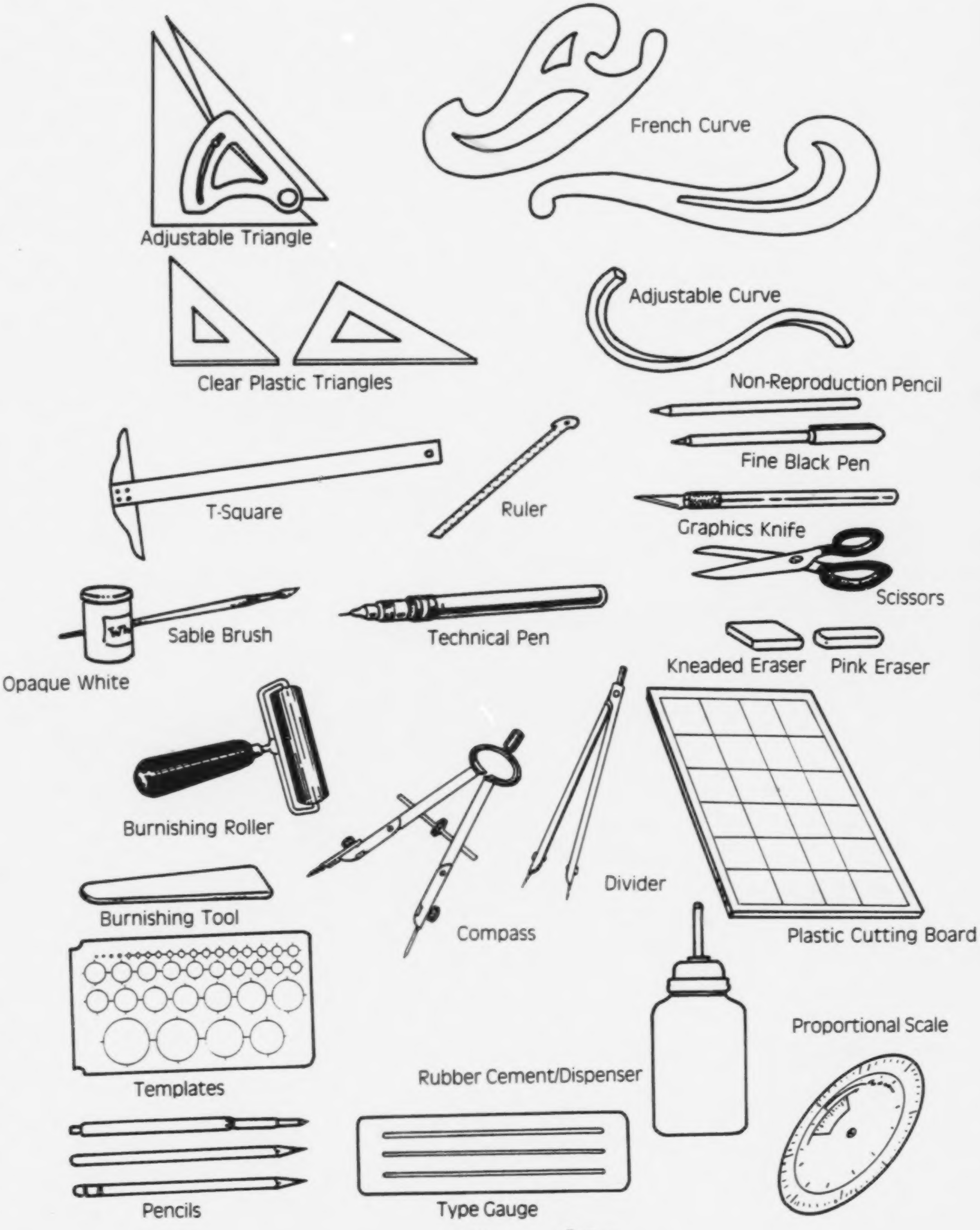
Light Box



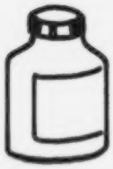
Light Table

HO 3

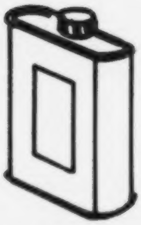
Paste-Up Tools


Adjustable Triangle
French Curve
Clear Plastic Triangles
Adjustable Curve
Non-Reproduction Pencil
Fine Black Pen
T-Square
Ruler
Graphics Knife
Scissors
Sable Brush
Technical Pen
Opaque White
Kneaded Eraser
Pink Eraser
Burnishing Roller
Divider
Burnishing Tool
Compass
Plastic Cutting Board
Templates
Rubber Cement/Dispenser
Proportional Scale
Pencils
Type Gauge

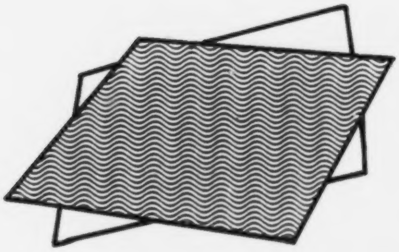
Paste-Up Supplies



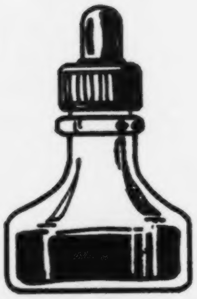
Rubber Cement



Rubber Cement Thinner

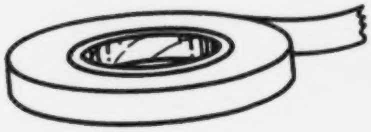


Shading or Tint Films

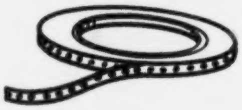


India Ink Bottle
with Eyedrop Stopper

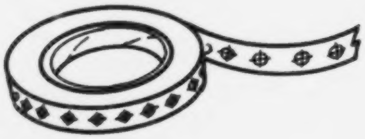
Opaque White



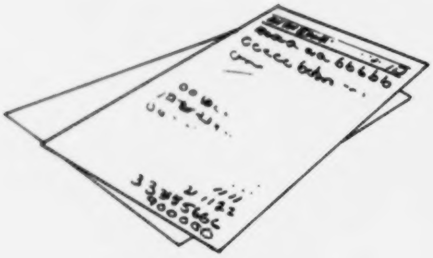
Clear and Masking Tape



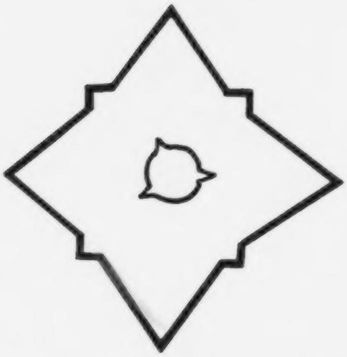
Border and Ruling Tape



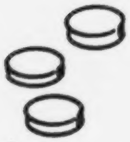
Register Marks



Dry Transfer Lettering



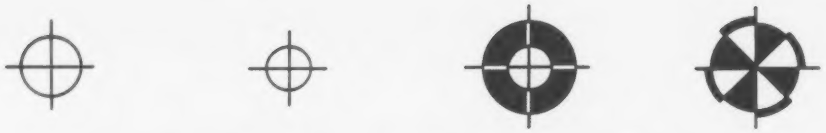
Register Tabs



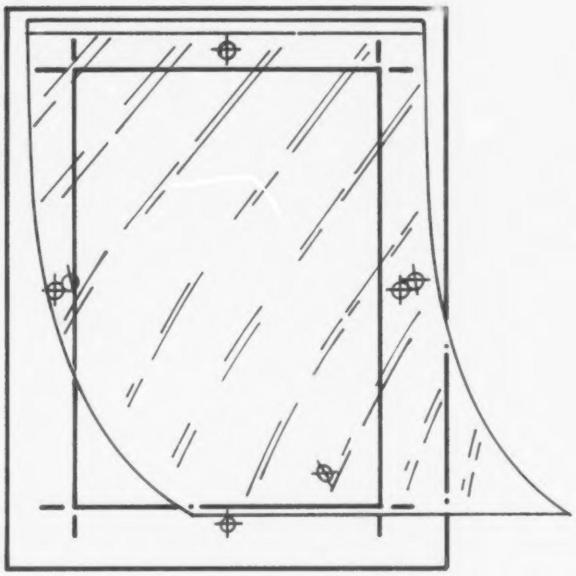
Register Buttons or Pins

HO 5

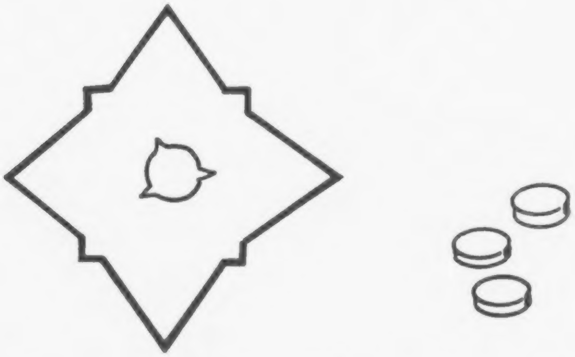
Registration



Examples of Registration Marks



Paste-Up with Overlay Sheet Containing Registration Marks



Pressure Sensitive Tab and Button

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

SCOPE OF UNIT:

The importance of using proper paste-up procedures cannot be overemphasized. Paste-up is the stage of production where every element is placed into position. If the element (type, illustration, etc.) is cracked or improperly positioned, the resulting job will also be cracked with improperly positioned elements.

INFORMATION TOPIC: OR DEMONSTRATION: IV-2

MAKING A SIMPLE PASTE-UP
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Make a simple three or four element paste-up.
2. Center all elements accurately.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. T-square
2. Light table
3. Blue pencil
4. Baseboard; overlay sheet; tissue
5. Amber cut-and-peel elements
6. Tape; rubber cement; wax

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 6, p. 117.

REFERENCES:

Crow, Wendell C. Communication Graphics. Englewood Cliffs, NJ: Prentice-Hall Inc., 1986.

INTRODUCTION:

The general knowledge of procedures and tools should be carried forward to this unit as the student makes a simple paste-up. Emphasis should be placed on accuracy and neatness; proper use of the tools should become a habit.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

STEPS OF PROCEDURE:

1. Prepare baseboard.
    a. Square with T-square on light table or drawing table; tape down.
    b. Draw center lines, both horizontal and vertical with light blue pencil.
    c. Draw in black twin marks and center marks.
2. Gather all paste-up elements.
    a. Check layout for approximate position.
    b. Trim excessive paper from elements; leave about 1/8 inch around image.
    c. Wax the back of all elements. If using rubber cement, handle each separately.
3. Adhere elements to baseboard.
    a. Work from top to bottom; square all elements with T-square as you proceed.
    b. Follow layout for position.
4. Add overlay, amber cut-and-peel elements, windows, etc.
5. Complete paste-up.
    a. Clean up.
    b. Tissue cover sheet.
    c. Add instructions to camera operator:
        - o Reproduction percentage
        - o Number of negatives
        - o Reverses, overprints, screen tint values marked on tissue cover
        - o Color break marked on tissue cover

6. Center copy on paste-up using the center-line method to determine horizontal placement.

   a. Square paste-up base sheet on drawing table or light table with T-square, and tape in place.

   b. Using ruler, find horizontal center of paste-up base, and indicate with line drawn with light blue pencil.

   c. Using ruler, measure each element, whether it is type, illustrations, or photos, and place a small dot at the center of each with the light blue pencil.

   d. Paste-up copy by simply lining up center dot on each element with center line on base sheet.

   e. Check each element with T-square for straightness as you paste them down.

OR

7. Center copy horizontally by measuring from edge; this requires two measurements for each element.

   (NOTE: Proportional spacing of typeset copy will not allow counting of characters and division by two, as the type characters are of varying sizes.)

8. Center copy on paste-up using the comprehensive layout as a guide to vertically position copy.

   (NOTE: Vertical centering requires more space at bottom than at top for obtaining optical center of balance.)

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

INTERACTION ITEMS:

1. Discuss the importance of a clean paste-up.
2. Identify the tools required to produce a clean paste-up and discuss how each tool is used.

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV: PRODUCING CAMERA-READY COPY

EVALUATION ITEMS: NAME OF STUDENT: ____________________

MAKING A SIMPLE PASTE-UP

EQUIPMENT:

1. T-square
2. Light table
3. Blue pencil
4. Baseboard; overlay sheet; tissue
5. Amber cut-and-peel elements
6. Tape; rubber cement; wax

DID THE STUDENT:	YES	NO
1. Prepare baseboard. a. Square with T-square on light table or drawing table; tape down.		
b. Draw center lines, both horizontal and vertical, with light blue pencil.		
c. Draw in black trim marks and center marks.		
2. Gather all paste-up elements. a. Check layout for approximate position.		
b. Trim excessive paper from elements; leave about 1/8 inch around image.		
c. Wax the back of all elements. If using rubber cement, handle each separately.		
3. Adhere elements to baseboard. a. Work from top to bottom; square all elements with T-square as you proceed.		

DID THE STUDENT:	YES	NO
b. Follow layout for position.		
4. Add overlay, amber cut-and-peel elements, windows, etc.		
5. Complete paste-up. a. Clean up.		
b. Tissue cover sheet.		
c. Add instructions to camera operator.		
6. Center copy on paste-up using the center-line method to determine horizontal placement. a. Square paste-up base sheet on drawing table or light table with T-square, and tape in place.		
b. Using ruler, find horizontal center of paste-up base, and indicate with line drawn with light blue pencil.		
c. Using ruler, measure each element, whether it is type, illustrations, or photos, and place a small dot at the center of each with the light blue pencil.		
d. Paste-up copy by simply lining up center dot on each element with center line on base sheet.		
e. Check each element with T-square for straightness as you paste them down.		
OR 7. Center copy horizontally by measuring from edge; this requires two measurements for each element.		
8. Center copy on paste-up using the comprehensive layout as a guide to vertically position copy.		

The student has satisfactorily completed the procedure "MAKING A SIMPLE PASTE-UP" according to the steps outlined.

____
Instructor's Signature
(Verifying Satisfactory Completion)

____
Date

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

SCOPE OF UNIT:

The importance of using proper paste-up procedures cannot be overemphasized. Paste-up is the stage of production where every element is placed into position. If the element (type, illustration, etc.) is cracked or improperly positioned, the resulting job will also be cracked with improperly positioned elements.

INFORMATION TOPIC: OR DEMONSTRATION: IV-3

SCALING COPY AND CROPPING PHOTOS
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Determine the reproduction percentage of copy by using a proportional scale.
2. Determine the reproduction percentage and proportion of copy by using the diagonal line method.
3. Correctly crop a photograph.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Proportional Scale
2. HO 2: Diagonal Line Method of Scaling
3. HO 3: Math Method of Scaling
4. HO 4: Cropping a Photograph
5. Copy extra page or tissue
6. Proportional scale

7. Ruler
8. Paper strips
9. T-square
10. Marking pencil
11. Tissue overlay

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 6, p. 117.

REFERENCES:

Crow, Wendell C. Communication Graphics. Englewood Cliffs, NJ: Prentice-Hall Inc., 1986.

INTRODUCTION:

There are several acceptable methods of scaling copy for the camera. It is suggested that the students have available a variety of photos and illustrations to determine copy size and percent reproduction. Cropping photos eliminates unnecessary portions of the picture while emphasizing the desired part. The various techniques of cropping photos should be covered as part of this same lesson.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

STEPS OF PROCEDURE: SCALING COPY

1. Use the proportional scale method to scale copy. (HO 1)
    a. Measure copy.
    b. Measure available space.
    c. Find width of original copy on inner circle of proportional scale.
    d. Line up width of original with size wanted on outer circle.
    e. Read in window the reduction or enlargement percentage.
    f. Repeat this operation for height.
2. Use diagonal line method to scale copy. (HO 2)
    a. Draw rectangle or square on paper same size as original copy or lightly on tissue covering copy.
    b. Draw diagonal line through corners.
    c. Measure desired width of scaled copy on base line.
    d. From this point, extend line upward until it crosses diagonal line.
    e. Point of intersection will be new height of scaled copy.
3. Use the mathematical method to scale copy. (HO 3)
    a. Determine percentage (%) of copy reduction or enlargement.
    b. Use this formula:

$$100 \times \frac{\text{Reproduction Size}}{\text{Copy Size}} = \%\ \text{enlargement/reduction}$$

    c. Use the same relative measurement point(s) for both the copy size and the reproduction size - height or width.

STEPS OF PROCEDURE: CROPPING A PHOTO (HO 4)

1. Place something, such as strips of paper, around edges of picture and move until only that portion desired shows.
2. Using T-square and marking pencil, mark two sets of horizontal lines in the side margins of the photo, showing desired area.
3. Mark two sets of vertical lines in the top and bottom margins of photo, showing desired area.
4. Alternate Method: Eliminate Steps 2 and 3 by taping a tissue overlay over photo and marking desired position of photo on overlay.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

INTERACTION ITEMS:

1. Discuss the various methods of scaling copy: proportional scale, diagonal line method and math method. What are the advantages of each?

2. How and why is a photograph cropped?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

EVALUATION ITEMS:

NAME OF STUDENT: ____________________

SCALING COPY AND CROPPING PHOTOS

EQUIPMENT:

1. Copy; extra page or tissue
2. Proportional scale
3. Ruler
4. Paper strips
5. T-square
6. Marking pencil
7. Tissue overlay

SCALING COPY

DID THE STUDENT:	YES	NO
1. Use the proportional scale method to scale copy. a. Measure copy.		
b. Measure available space.		
c. Find width of original copy on inner circle of proportional scale.		
d. Line up width of original with size wanted on outer circle.		
e. Read in window the reduction or enlargement percentage.		
f. Repeat this operation for height.		
2. Use diagonal line method to scale copy. a. Draw rectangle or square on paper same size as original copy or lightly on tissue covering copy.		
b. Draw diagonal line through corners.		
c. Measure desired width of scaled copy on base line.		

DID THE STUDENT:	YES	NO
d. From this point, extend line upward until it crosses diagonal line.		
e. Point of intersection will be new height of scaled copy.		
3. Use the mathematical method to scale copy. a. Determine percentage (%) of copy reduction or enlargement.		
b. Use this formula: 100 x $\frac{\text{reproduction size}}{\text{copy size}}$ = % enlargement/reduction		
c. Use the same relative measurement point(s) for both the copy size and the reproduction size - height or width.		
CROPPING A PHOTO 1. Place something, such as strips of paper, around edges of picture and move until only that portion desired shows.		
2. Using T-square and marking pencil, mark two sets of horizontal lines in the side margins of the photo, showing desired area.		
3. Mark two sets of vertical lines in the top and bottom margins of photo, showing desired area.		
4. ALTERNATE METHOD: Eliminate Steps 2 and 3 by taping a tissue overlay over photo and marking desired position of photo on overlay.		

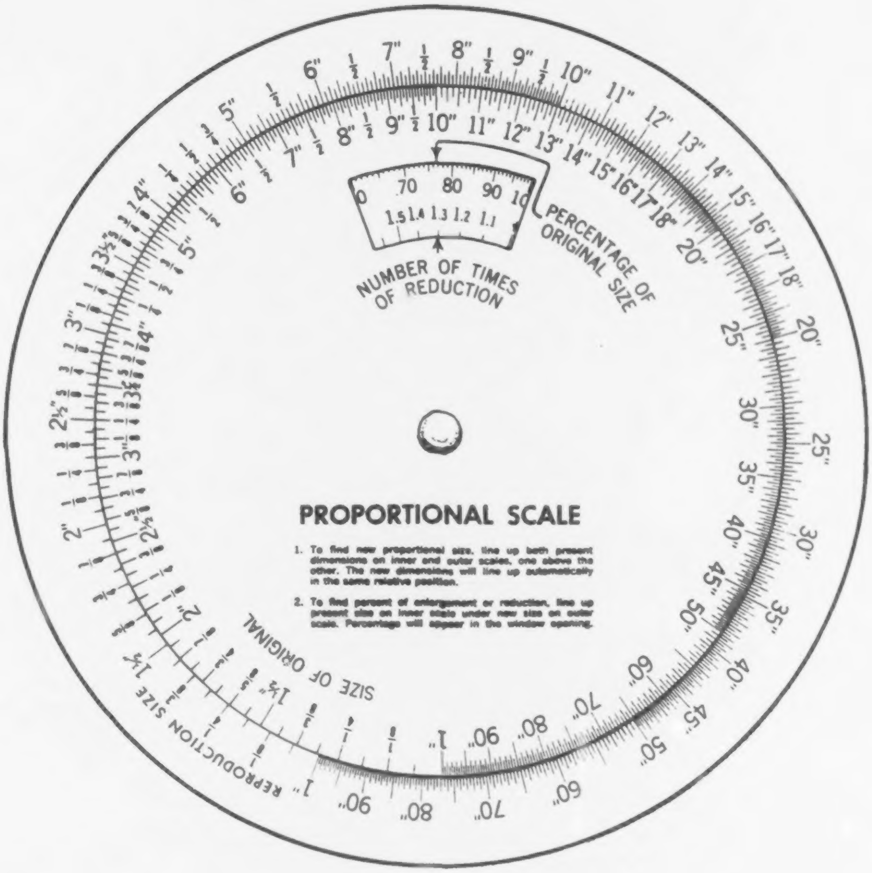
The student has satisfactorily completed the procedure "SCALING COPY AND CROPPING PHOTOS" according to the steps outlined.

____
Instructor's Signature
(Verifying Satisfactory Completion)

____
Date

HO 1

Proportional Scaling

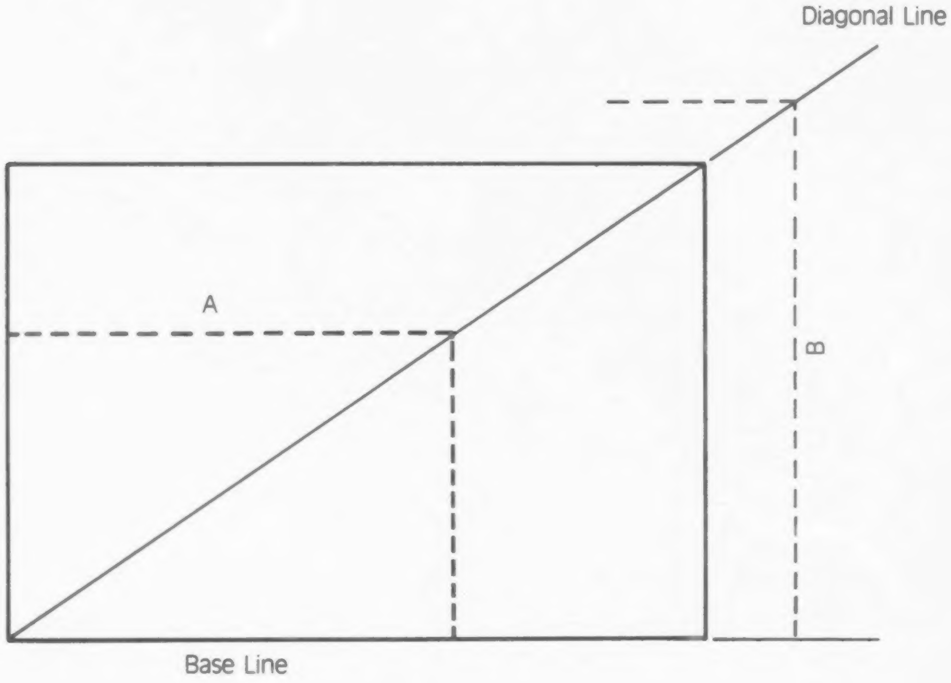

NUMBER OF TIMES OF REDUCTION
PERCENTAGE OF ORIGINAL SIZE
70 80 90 100
1.5 1.4 1.3 1.2 1.1
PROPORTIONAL SCALE
SIZE OF ORIGINAL
REPRODUCTION SIZE

1. To find new proportional size, line up both present dimensions on inner and outer scales, one above the other. The new dimensions will line up automatically in the same relative position.
2. To find percent of enlargement or reduction, line up present size on inner scale under new size on outer scale. Percentage will appear in the window opening.

Percentages shown in the window reading more than 100 are enlargements; below 100 are reductions.

Diagonal Line Method of Scaling

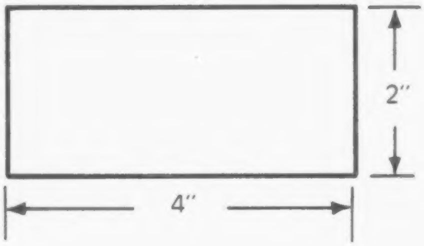
Original Copy is 2¾" high by 4" wide. Line A shows a height reduction to 1¾," and a corresponding new width. Line B shows an enlargement of width to 4¾" and a corresponding new height.


Diagonal Line
A
B
Base Line

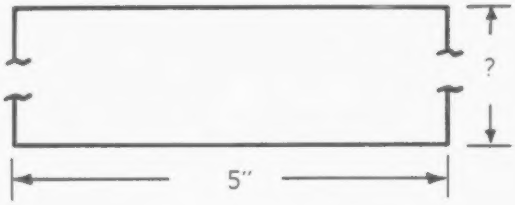
Math Method of Scaling

Example: Math Method

Original copy is 4″ wide by 2″ high.



Desired reproduction size is 5″ wide.



Substitute the above formula:

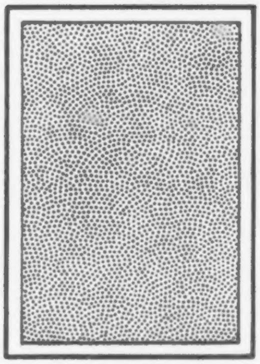
$$100 \times \frac{5}{4} = 100 \times 1.25 = 125\%$$

You cannot control both dimensions of the new size. Either you must enlarge or reduce to fit the height into a desired space, or you must fit the width. The sample above enlarges the width to fit the new size. In this example, the new height would be 125% of the original size.

$$1.25 \times 2'' = 2.5'' \text{ or } 2\tfrac{1}{2}''$$

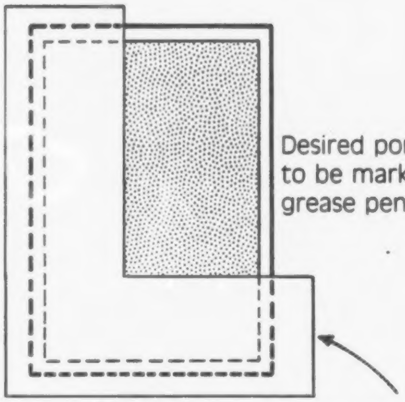
Cropping a Photograph

Step 1



Original

Step 2

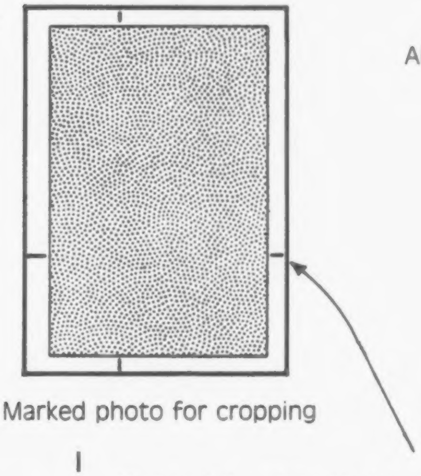


Desired portion selected to be marked with grease pencil

Paper or something to obscure picture for cropping

Cropped

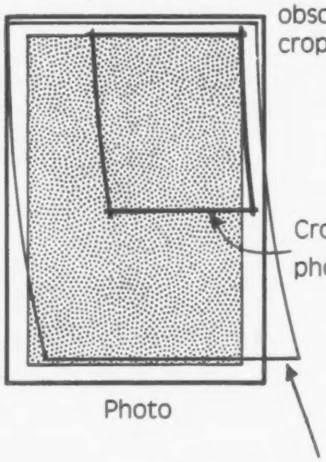
Step 3



Marked photo for cropping

Horizontal and vertical marks in margins of original photo: these should be in black so they will show on the halftone negative and be a guide to the stripper.

Alternate Method



Crop lines drawn on photo overlay.

Photo

Overlay must be folded back or removed to shoot halftone.

Alternate Method: Steps 2 and 3 may be eliminated by taping a tissue overlay over the photo and marking the desired position of the photo on the overlay.

NOTE: Care must be taken when drawing on the tissue to avoid excessive pressure on the pencil which may dent the photo. These dents will show on halftones shot from this photo.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

SCOPE OF UNIT:

The importance of using proper paste-up procedures cannot be overemphasized. Paste-up is the stage of production where every element is placed into position. If the element (type, illustration, etc.) is cracked or improperly positioned, the resulting job will also be cracked with improperly positioned elements.

INFORMATION TOPIC: OR DEMONSTRATION: IV-4

USE OF HAND-CUT RUBY OR AMBER FILM
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Make a dropout or outline mask for a halftone.
2. Make an art overlay for a second color or screen tint.
3. Make windows on a paste-up for halftones using amber cut-and-peel film.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Making Dropouts
2. HO 2: Overlays-Keyline Art
3. HO 3: Making Windows for Halftones
4. Artwork (photograph or illustration)
5. Ruby or amber film
6. Trimboard

7. Stripping knife
8. Layout table
9. T-square; triangle
10. Light blue pencil
11. Red lithographer's tape

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 6, p. 117.

REFERENCES:

Crow, Wendell C. Communication Graphics. Englewood Cliffs, NJ: Prentice-Hall Inc., 1986, ch. 10.

INTRODUCTION:

Amber and ruby cut-and-peel film can save countless hours of film assembly time if properly used by the mechanical artists. This lesson outlines several common uses of this material.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

NOTE: Ruby and amber hand-cut films. These films are available both in a deep red color called "ruby" and a dark orange color called "amber"; they are known as hand-cut, cut-and-peel, ruby stripping film, etc. This material, as with many other items used in graphic arts, is often called by a popular trade name. Amberlith and Rubylith are registered trademarks of the Ulano Corp. Amber cut-and-peel film is easier to use on artwork for overlays and windows because its easier to see through for aligning with keylines, etc. Ruby film should be used on any application in which the film must hold back actinic light. Amber will reflect in the camera the same as ruby and will leave a clear window on ortho film.

(For purposes of this outline on paste-up, "ruby" and "amber" can be used interchangeably.)

STEPS OF PROCEDURE:

1. Make a dropout using the information provided in the handout. (HO 1)

   a. Cut, on trimboard, a piece of ruby film to the same size as photograph or illustration to be used.

   b. Place ruby film, clear base side down, over photo and tape in place along top edge.

   c. Using stripping knife, carefully outline area that is to be dropped out.

      (CAUTION: Use extreme care to avoid cutting through ruby film base and damaging photo or illustration. A few practice cuts on ruby film scraps would be helpful in avoiding this type of mistake.)

   d. Carefully peel away the portion of the ruby film from the area of the photo that will be printed.

   e. Check work for accuracy, then turn in for evaluation.

      (NOTE: This job may be completed by the instructor as a demonstration, or may be retained as a project for students completing darkroom, stripping, and platemaking instructions.)

2. Make an overlay for keyline art using the information provided in the handout. (HO 2)

   a. Cut, on trimboard, a piece of ruby film to the same size as photo or illustration to be used.

   b. Place ruby film, clear base side down, over photo and tape in place along top edge.

      (NOTE: When preparing keyline art, a slight overlap of colors is desired to avoid any gap between colors.)

   c. Using stripping knife, carefully outline area that is to be screened or printed in separate color.

      (CAUTION: Use extreme care to avoid cutting through ruby film base and damaging photo or illustration. Again, a few practice cuts on ruby film scraps would be helpful in avoiding this type of mistake.)

   d. Peel away all areas of ruby film except that which is to be a separate color.

   e. Prepare a separate ruby film overlay for each area or color desired.

   f. Check work for accuracy, then turn in for evaluation.

      (NOTE: This job may be completed by the instructor as a demonstration, or may be retained as a project for students completing darkroom, stripping, and platemaking instruction.)

3. Make windows for halftones using the information provided in the handout. (HO 3)

   a. Using T-square, place illustration board on layout table and tape in place.

   b. Mark, with light blue pencil, location of photographs on the illustration board.

   c. Cut, on trimboard, a piece of ruby film to the same size as illustration board.

   d. Place ruby film, clear base side down, over illustration board and tape in place along top edge.

e. Using T-square, triangle, and stripping knife, carefully cut locations of photographs in the ruby film.

   (CAUTION: Again, use extreme care to avoid cutting through film base. Practice cuts are again recommended.)

f. Peel away all areas of ruby film except that which will be printed as photographs.

g. Check all "windows" on ruby film for squareness and proper location.

   (NOTE: Red lithographers tape may be used as patches for small mis-cuts or slips if it is done neatly and accurately.)

h. Turn in for evaluation.

   (NOTE: This job may be completed by the instructor as a demonstration, or may be retained as a project for students completing darkroom, stripping, and platemaking instructions.)

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

INTERACTION ITEMS:

1. Discuss the use of amber and ruby cut-and-peel film and the proper method to prepare it.
2. How is a dropout prepared?
3. What is an overlay and how is it produced?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

EVALUATION ITEMS: NAME OF STUDENT:____________________

USE OF HAND-CUT RUBY OR AMBER FILM

EQUIPMENT:

1. Artwork (photograph or illustration)
2. Ruby or amber film
3. Trimboard
4. Stripping knife
5. Layout table
6. T-square; triangle
7. Light blue pencil
8. Red lithographer's tape

DID THE STUDENT:	YES	NO
1. Make a dropout using the information provided. a. Cut, on trimboard, a piece of ruby film to the same size as photograph or illustration to be used.		
b. Place ruby film, clear base side down, over photo and tape in place along top edge.		
c. Using stripping knife, carefully outline area that is to be dropped out.		
d. Carefully peel away the portion of the ruby film from the area of the photo that will be printed.		
e. Check work for accuracy, then turn in for evaluation.		
2. Make an overlay for keyline art using the information provided. a. Cut, on trimboard, a piece of ruby film to the same size as photo or illustration to be used.		
b. Place ruby film, clear base side down, over photo and tape in place along top edge.		

DID THE STUDENT:	YES	NO
c. Using stripping knife, carefully outline area that is to be screened or printed in separate color.		
d. Peel away all areas of ruby film except that which is to be a separate color.		
e. Prepare a separate ruby film overlay for each area or color desired.		
f. Check work for accuracy, then turn in for evaluation.		
3. Make windows for halftones using the information provided. a. Using T-square, place illustration board on layout table and tape in place.		
b. Mark, with light blue pencil, location of photographs on the illustration board.		
c. Cut, on trimboard, a piece of ruby film to the same size as illustration board.		
d. Place ruby film, clear base side down, over illustration board and tape in place along top edge.		
e. Using T-square, triangle, and stripping knife, carefully cut locations of photographs in the ruby film.		
f. Peel away all areas or ruby film except that which will be printed as photographs.		
g. Check all "windows" on ruby film for squareness and proper location.		
h. Turn in for evaluation.		

The student has satisfactorily completed the procedure "USE OF HAND-CUT RUBY OR AMBER FILM" according to the steps outlined.

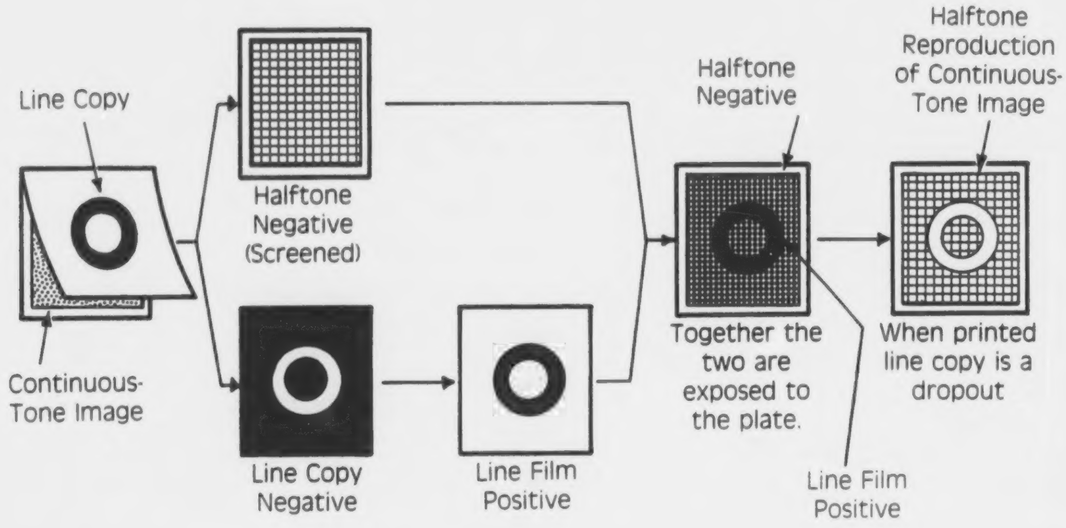
Instructor's Signature
(Verifying Satisfactory Completion)

Date

Making Dropouts

1. A dropout eliminates portions of the photo or illustration without damaging the original copy.
2. This method can accurately achieve detailed dropouts.
3. Key original artwork for colors and include register marks.
4. Tape amber film over the artwork in register.
5. Cut top layer of film with stripping knife and peel away nonimage area leaving clear base. This leaves a solid amber image which will shoot as a clear window on litho film.
6. **NOTE:** If in step 5 the image is peeled away instead of the nonimage, the resulting cell can be used as a line copy negative. This assumes no enlargement or reductions are necessary.

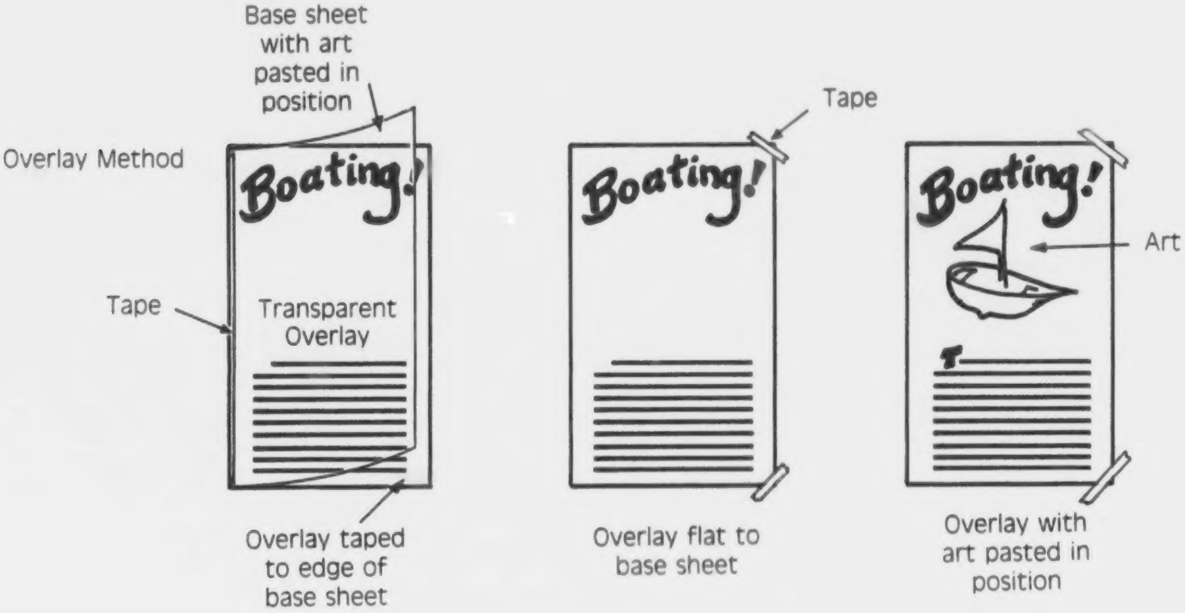
DROPOUT SCHEMATIC


Line Copy
Continuous-Tone Image
Halftone Negative (Screened)
Line Copy Negative
Line Film Positive
Halftone Negative
Together the two are exposed to the plate.
Line Film Positive
Halftone Reproduction of Continuous-Tone Image
When printed line copy is a dropout

Overlays - Keyline Art

1. Overlays provide separate camera copy for colors or tints without damaging the original copy.
2. Key original artwork for colors and include register marks.
3. Tape amber film over the artwork in register.
4. Cut top layer of film with stripping knife and peel away nonimage area leaving clear base. This leaves a solid amber image which will shoot as a clear window on litho film.
5. Prepare an amber film overlay for each color or screen tint area to be printed.

NOTE: When preparing camera-ready copy for keyline art, the overlays for separate colors should overlap slightly to eliminate any space between colors.


Base sheet with art pasted in position
Tape
Overlay Method
Boating!
Boating!
Boating!
Art
Tape
Transparent Overlay
Overlay taped to edge of base sheet
Overlay flat to base sheet
Overlay with art pasted in position

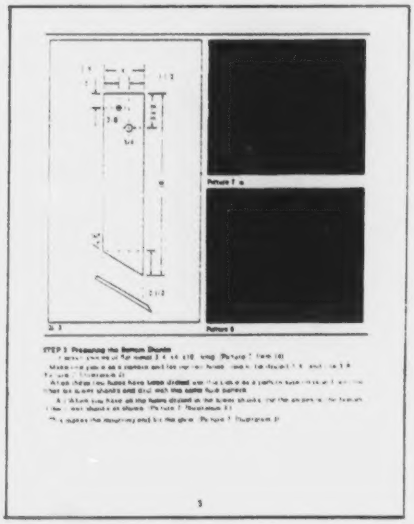
HO 3

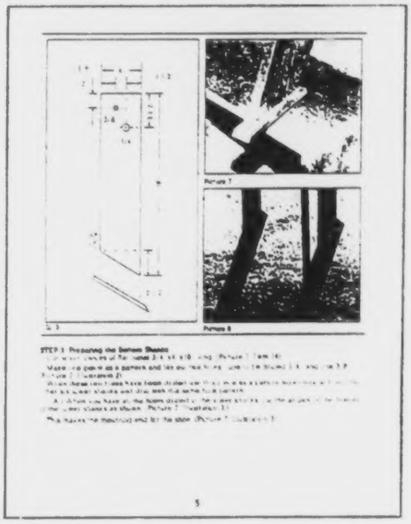
Making Windows for Halftones

1. Amber cut-and-peel film provides an accurate method of preparing windows for halftone negatives, particularly when line and halftone work is close together.
2. Amber film preparation of windows in a row or group are neater and more accurate than paste-up windows.
3. Place guidelines on the artboard showing the location of the photos.
4. Place amber film over the artboard. Because amber film is transparent, the guidelines may be easily followed when cutting windows with a blade.
5. Peel away the top layer of amber in all areas except where photos are to appear.
6. Paste line copy on artboard so both windows and line copy can be photographed as one exposure; or if desired, windows may be exposed to second negative and merged with line work using the complementary flat method. (See NOTE below)
7. Strip halftone negatives behind the clear windows of the line negative.

NOTE: Separate flats may be necessary when line copy and photographs are very close together. In this case, halftones are stripped into the windows on one flat, and line copy is stripped onto another flat. Then, an exposure of each flat to the same plate is made. See Unit VIII for details of complementary flats.

From this camera-ready art... ...You get this effect.





LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV: PRODUCING CAMERA-READY COPY

SCOPE OF UNIT:

The importance of using proper paste-up procedures cannot be overemphasized. Paste-up is the stage of production where every element is placed into position. If the element (type, illustration, etc.) is cracked or improperly positioned, the resulting job will also be cracked with improperly positioned elements.

INFORMATION TOPIC: IV-5 OR DEMONSTRATION:

ELECTRONIC PASTE-UP AND IMAGING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Describe ways paste-up will be done electronically in the future.
2. Discuss the types of skills a prepress worker of the future will need.
3. Explain the meaning of WYSIWYG.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. *Comprehensive Graphic Arts*. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 6, p. 117.

REFERENCES:

Crow, Wendell C. *Communication Graphics*. Englewood Cliffs, NJ: Prentice-Hall Inc., 1986. ch. 7.

INTRODUCTION:

Although the printer of the future should know about the techniques and processes discussed in lessons one through four of this unit, the importance of developing skills in these will decrease as electronic technology now available becomes more and more popular in the industry.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

OUTLINE: (Key Points)

I. Electronic Publishing

Modern electronic technology has brought us new, nontraditional ways of preparing camera-ready copy. These new technologies have, in fact, given us ways to skip large segments of the traditional processes of preparing materials for printing. It is now possible and commonplace in some segments of the industry to merge and manipulate a variety of electronically captured texts and graphics, convert these to professional quality type and illustrations, and impose and image them on the printing plate, all in a matter of seconds. In many cases, the printing plate is the first "hard" copy that can be seen of this composite job.

The world of prepress, particularly typesetting, copy preparation (paste-up) and image assembly is rapidly changing. Some of the terms used and associated with this technology are: desk-top publishing, electronic publishing, word processing, electronic imaging, computer paste-up, automatic pagination, electronic make-up, digital copy preparation, etc.

The possibilities suggested by this new technology are endless and are limited only by the imagination. It is safe to say that paste-up and probably all of other prepress operation as described in this study guide will rapidly become history.

The teacher of these areas in graphic arts should begin to ask himself (herself) if the particular techniques and processes that he/she teaches are pertinent to future careers in graphic arts. Teachers of graphic arts no longer teach traditional typesetting using foundry type and linecasting machines because these processes have been updated. The time will soon come when graphic arts educators must also examine the teaching content and emphasis of the prepress areas of copy preparation, image assembling, stripping, proofing and platemaking; the current practices in these areas will no longer represent modern technology and current industrial practices.

II. What You See Is What You Get!

WYSIWYG is the catch word of copy preparation of the 80's. This simply means that we now can easily manipulate images of text and graphics on a computer terminal screen and capture, with exactness, that composed image. It is now unnecessary to use series of complicated computer codes to designate type sizes, fonts, families, etc. Illustrations have stopped being represented by an "X" or a box. It is no longer required that we print out type from one machine, enlarge, reduce or distort art on another machine, and then sit down and laboriously cut and paste these to a board that can be photographed. WYSIWYG means that this manipulated electronic image will print out exactly as seen on the screen; this image can be created almost as easily as playing an electronic arcade game.

III. Software/Hardware

As this is written, new hardware is being developed and new software is being written. A few short years ago computers required very complex programming and lengthy operator training to use them. Typesetting and management systems were the first areas in graphic arts to utilize computers, but they too required extensive programming and operator training.

How are today's computers different? The tremendously large memory required by the earlier units to use with graphics is now commonplace with the present generation of hardware. The manipulation and revision of images is now easily accomplished with the "mouse" and "joystick" in conjunction with the keyboard.

The "new" software is characterized by pull-down menus and fail-safe routines built into the system. Draw, point and write programs can now be combined in assembly programs such as Pagemaker™; this allows freedom to design and construct complete pages, including type and graphics.

Impact and dot matrix printers are now supplemented by laser printers, the so-called smart printer we have dreamed about for so long. All of this technology produces images that are "good enough" to accomplish most tasks at hand. If the quality is not good enough, modern digital typesetters are compatible to this input; this will produce the quality which graphic arts professionals have come to expect.

IV. Summary and Conclusion

  A. Electronic publishing

  B. What you see is what you get

  C. Software/hardware

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

INTERACTION ITEMS:

1. How will the developing technology affect the job of the paste-up artist?

2. What new skills must be developed to be successful with this technology?

3. What skills that are now important to the prepress technician will remain important with the new technology?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

EVALUATION ITEMS:

1. What electronic "aids" are available for doing paste-up?

2. What skills might you need to work in copy preparation 20 years from now?

3. What is meant by WYSIWYG?

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IV : PRODUCING CAMERA-READY COPY

ANSWERS TO EVALUATION ITEMS:

1. The computer is, of course, the greatest electronic "aid" to copy preparation. Graphics and type have been produced for the paste-up technician for some years using the computer. Only recently has the computer changed the job of the copy-preparation technician from that of a manual skill of arranging and adhering copy bits on a board to a mental skill of computer operation.

2. Skills expected of a copy-preparation technician in the year 2008 would be computer skills, an understanding of the visual image, accuracy, and problem solving ability.

3. WYSIWYG stands for "what you see is what you get." It represents, more than anything else, what the current technology in computers has brought to graphic arts. It means that the image can be designed on the computer screen and reproduced exactly, without the use of complex computer commands and format codes.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V: EXPOSING WITH A CAMERA

SCOPE OF UNIT:

When photosensitive materials are exposed to image-making light, an invisible image called a latent image is produced. This image is produced whether the exposure is done by camera, by contacting, by scanner or by accident. Unit V explores camera exposures and the variables inherent in the process. Unit V must be taught in conjunction with Unit VI, Processing Photographic Material. Many commonalities exist between Exposing With A Camera and Contacting, Unit VII.

INFORMATION TOPIC: V-1 OR DEMONSTRATION:

FILM AND LIGHT SENSITIVE MATERIALS
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Name the three characteristics that define film. Describe each.
2. Draw a diagram of the film structure. Label each layer.
3. Explain the terms "opaque" and "transparent."
4. Compare different base materials.
5. Describe emulsion ingredients.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. TM 1: Antihalation Explained
2. TM 2: Film Structure (Cross Section)
3. TM 3: Color Sensitivity of Film
4. TM 4: Characteristic Curves Compared
5. AS 1: Showing the Difference Between High Contrast (Lith) Film and Continuous-Tone Film
6. AS 2: Showing Color Sensitivity of Film

INFORMATIONAL ASSIGNMENT: (Student)

Kagy, Frederick D. and J. Michael Adams. Graphic Arts Photography. North Scituate, MA: Breton Publishers, 1983, ch. 5.

REFERENCES:

Cogoli, John E., et al. Graphic Arts Photography. Pittsburgh, PA: Graphic Arts Technical Foundation, 1981, ch. 5.

INTRODUCTION:

Controlling the procedures and variables in exposing light sensitive material is most complex. So many hard to control variables enter into the process of making the image that one sometimes will simply give up. The material in this lesson should help the student understand the variables involved with light sensitive materials. When studied with the other lessons of this unit, the student should start to understand that predictable quality and control is not an accident.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

OUTLINE: (Key Points)

I. Light Sensitive Materials - Type and Structure

A. Opaque - light sensitive emulsions coated on opaque or nontransparent bases; photo paper, offset plates, etc.

Transparent - light sensitive emulsions coated on transparent bases; usually called "film"

This lesson, for the most part, will deal with these transparent base films.

B. Structure

1. Base - inert, clear material acts as carrier for light sensitive coating, usually flexible

a. Polyester - most common today in graphic arts; dimensionally stable and optically clear; relatively inexpensive

b. Glass - seldom used but is the original transparent base, stable and optically clear, but not flexible; used only for scientific work today

c. Polystyrene - common in less expensive films; called plastic base; dimensionally stable, but not very satisfactory optically; tough, difficult to cut; may craze when bent sharply

d. Triacetate - traditional base for photographic films; cellulose product will absorb moisture and it lacks dimensional stability. Strippers like to work with it because it can be easily scored and broken. It is expensive and it has good optical characteristics.

e. Paper - some papers have a glassine-like quality which allows them to be used as film bases. These have poor quality and are not recommended for graphic arts.

2. Emulsion - light sensitive coating

   a. Gelatin - high quality, made of animal protein; holds the light sensitive silver particles suspended on the film base

   b. Silver halides - compound of silver

      (1) Silver bromide

      (2) Silver iodide

      (3) Silver chloride

      (4) When exposed to light and developed, they are reduced to black metallic silver. The amount of blackening, or density, will vary with the amount of light exposure.

   c. Silverless film - based on recent technology and technical improvements of traditional photo technologies

3. Antihalation coating - a dark dye coating on the film to absorb light scatter, internal reflection and flare. Lack of this protection may result in a double image or shadow-like second image called a "halo." Hence, it is called antihalation. (TM 1)

4. Anticurl, antistress, scratch protection coating; coated on emulsion to protect it and to prevent uneven moisture absorption, which can cause curling, from developing on it

5. Adhesive layers between base and coatings

6. Diagram of structure (TM 2)

II. Light Sensitive Materials - Characteristics

A. Color sensitivity - (special sensitivity) (TM 3)

1. Panchromatic - equally sensitive to all visible colors; use no safelights

2. Orthochromatic - sensitive to blue and blue-green ranges of visible spectrum; not sensitive to red end of spectrum; use red safelights

3. Blue sensitive - sensitive to only blue end of spectrum; use amber and/or red safelights

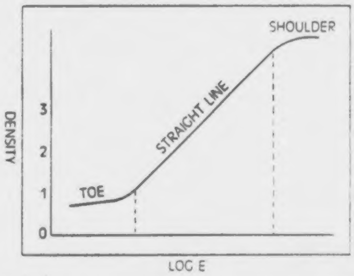
B. Contrast - means difference; difference between lights, darks and the range of tones between

1. Continuous-tone - reproduces a range of tones from light (white) to dark (black) and all the shades and tones between

2. High contrast - reproduces all tones as either black or white

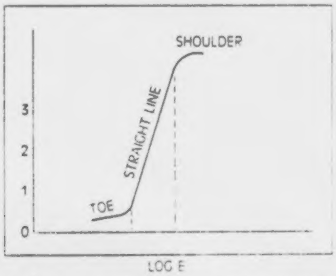
3. Characteristic curve explained (TM 4) (D log E curve or H & D curve)

    a.



This characteristic curve represents the density of a continuous-tone film plotted against its exposure (log of exposure). Note: The straight line portion of this curve (between lines) shows the wide variances in resulting density when exposure is increased and decreased. Hence, all shades of gray between white (toe) and black (shoulder) can result when copy or subject has a variety of shades or tones.

    b.



This characteristic curve represents the density of a lith film (high contrast) plotted against its exposure (log of exposure). Note: The straight line portion of this curve shows that all of the densities are condensed within a very short span of exposures. This exposure to light will result in all copy densities being represented on the negative by either clear areas or black areas, but virtually no intermediate tones or shades.

c. Film speed - speed refers to the amount of light necessary to cause an image to be recorded on a particular emulsion.

  1. Fast films require very little light.

  2. Slow films require very much light.

  3. Exposure index is a way to put a numerical value to the speed.

    a. ASA system was developed by the American Standards Association (now called American National Standards Institute or ANSI).

    b. A film rated at 400 ASA requires only half as much light to expose it as one rated at 200 ASA.

    c. Most lith films used in graphic arts are rated in the range of 6 to 12 ASA. These are considered very slow films.

D. Sensitized material types - important characteristics are: speed, contrast and color sensitivity.

  1. Orthochromatic (ortho) lith film for line work (often called line film) is a commonly used film. Note that none of the above characteristics defines this film.

    a. Ortho = sensitive to blue/blue-green

    b. Litho = high contrast

    c. Line film = slow (low ASA)

  2. All three characteristics are necessary to define film and any combination is possible. Example

    a. Panchromatic (pan) = sensitive to all colors

    b. Continuous-tone (professional)

    c. High speed = high ASA

  This film would be the black and white film used in your 35 mm camera.

E. Film data sheets - manufacturers pack a data sheet with each package or box of film. Always consult this sheet for recommendations of:

1. Characteristic curve
2. Recommended safelights
3. Recommended developer
   a. Time
   b. Temperature
4. Other chemicals
5. Recommended exposure
   a. Time
   b. Kind of light for exposure
   c. Film speed
6. Film coding (notches)

F. Other light sensitive materials

1. Plates - litho, engraving, etc.
2. Proofing papers and films
3. Print papers
4. Photo resists and photo coatings

III. Summary and Conclusion

A. Light sensitive materials - type and structure

B. Light sensitive materials - characteristics

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

INTERACTION ITEMS:

1. Why do we use light blue pencil to draw guide lines on our paste-up? Why don't those lines show up on ortho film?

2. Why do we use lith (high contrast) film to shoot paste-ups?

3. If we paste red letters instead of black on our paste-up, what would be the results when shot with ortho film?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

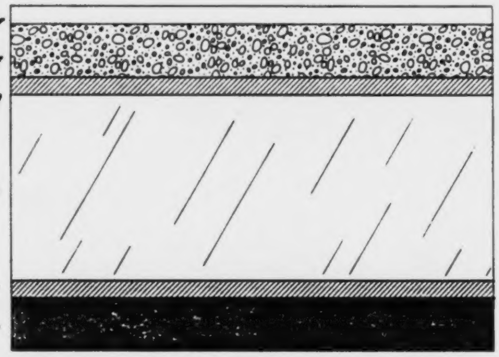
LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

EVALUATION ITEMS:

1. Label the diagram below:



a) ______________

b) ______________

c) ______________

d) ______________

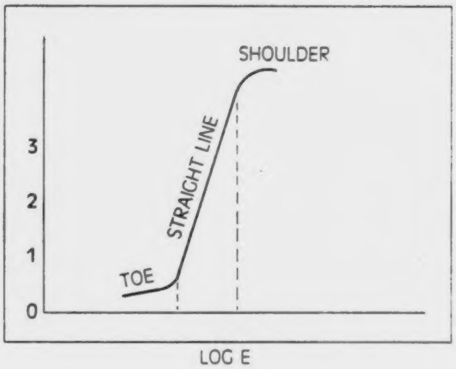
e) ______________

f) ______________

2. The characteristic curve shown below is of a:

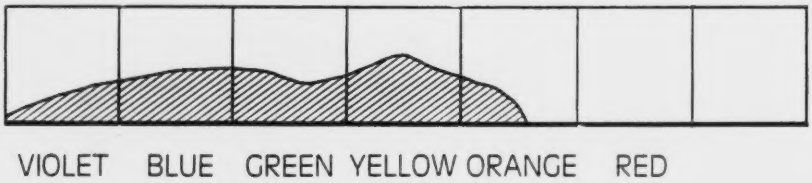
a) High contrast film

b) Continuous-tone film



3. The illustration shown below is of a spectrogram of:

a. panchromatic film
b. orthochromatic film
c. blue sensitive film



4. Name four base materials used for films.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

5. What are the three characteristics that one needs to know about a film?

a. ______________________________

b. ______________________________

c. ______________________________

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

ANSWERS TO EVALUATION ITEMS:

1. a. protective layer (anti-stress)
   b. light sensitive emulsion
   c. adhesive
   d. base
   e. adhesive
   f. antihalation coating
2. a
3. b
4. a. polyester
   b. polystyrene
   c. acetate
   d. glass
5. a. film speed
   b. film contrast
   c. color sensitivity

Antihalation Explained

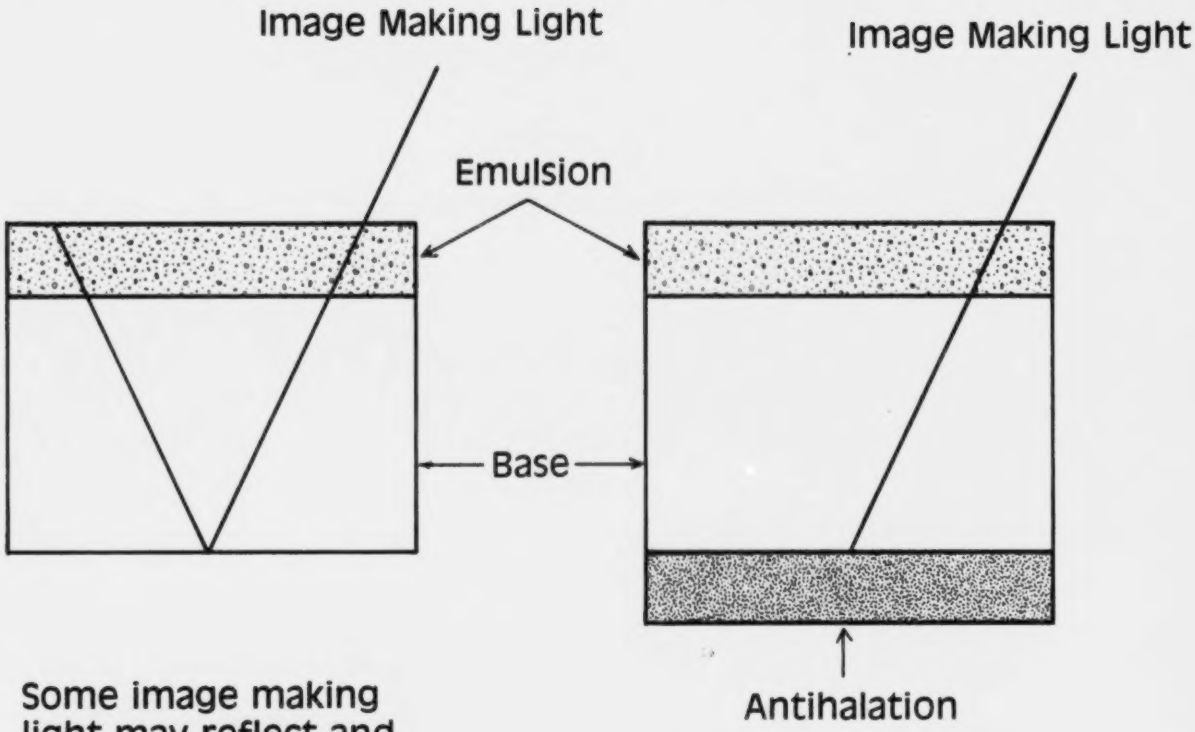
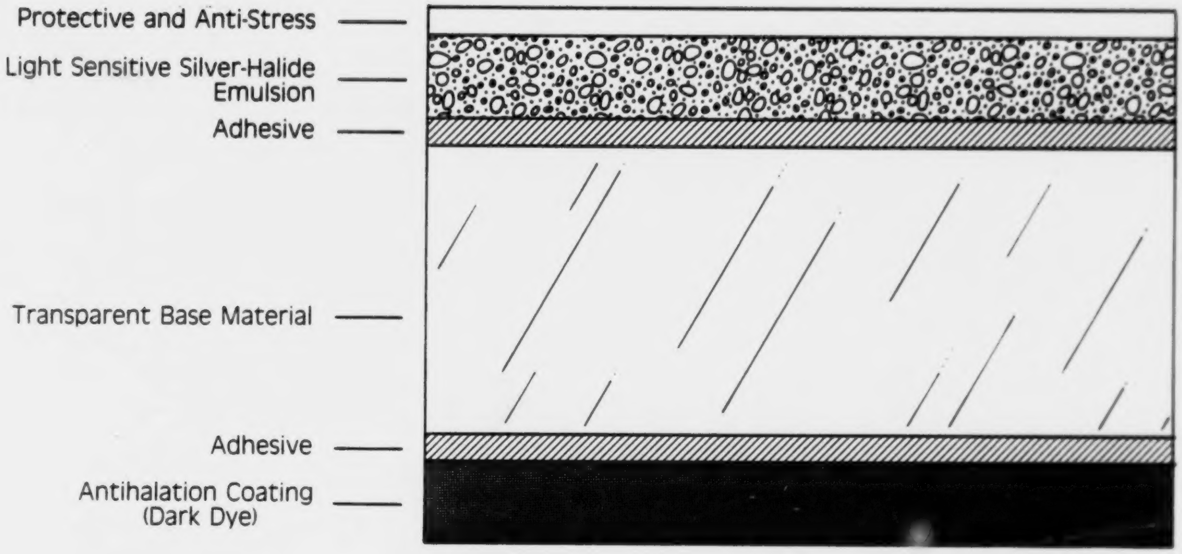


Image Making Light
Image Making Light
Emulsion
Base
Antihalation

Some image making
light may reflect and
re-expose emulsion.

Antihalation coating
absorbs image making
light after going
through the base.

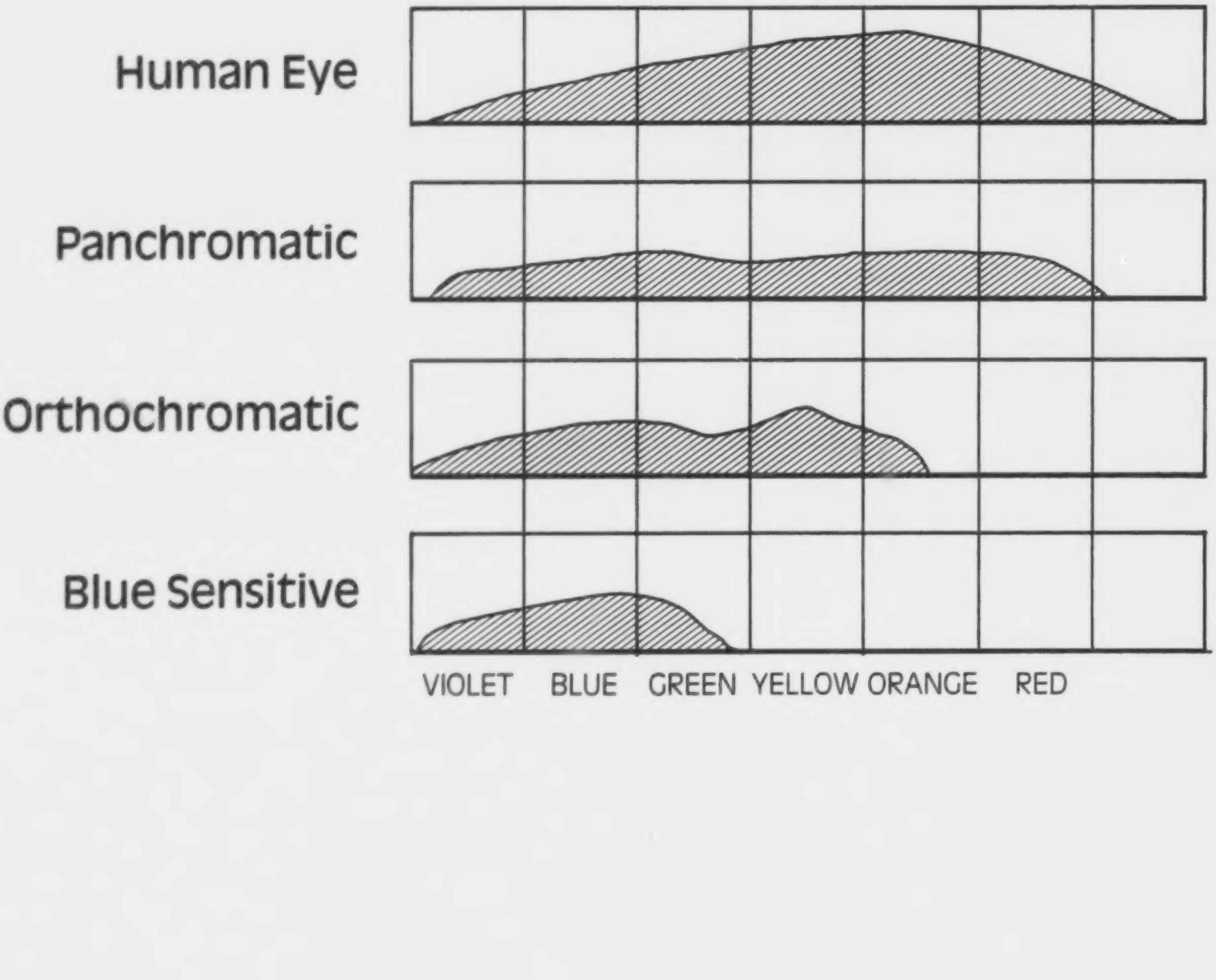
Film Structure (Cross Section)


Protective and Anti-Stress
Light Sensitive Silver-Halide Emulsion
Adhesive
Transparent Base Material
Adhesive
Antihalation Coating (Dark Dye)

TM 3

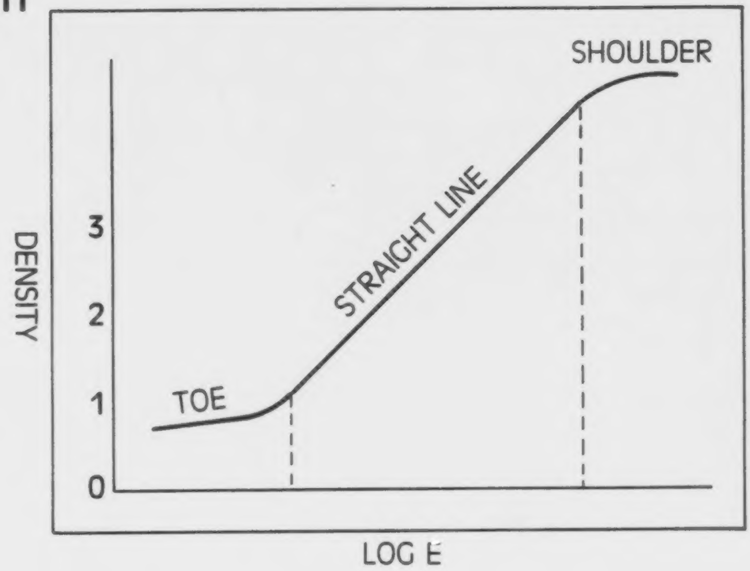
Color Sensitivity of Film

SPECTROGRAM COMPARED

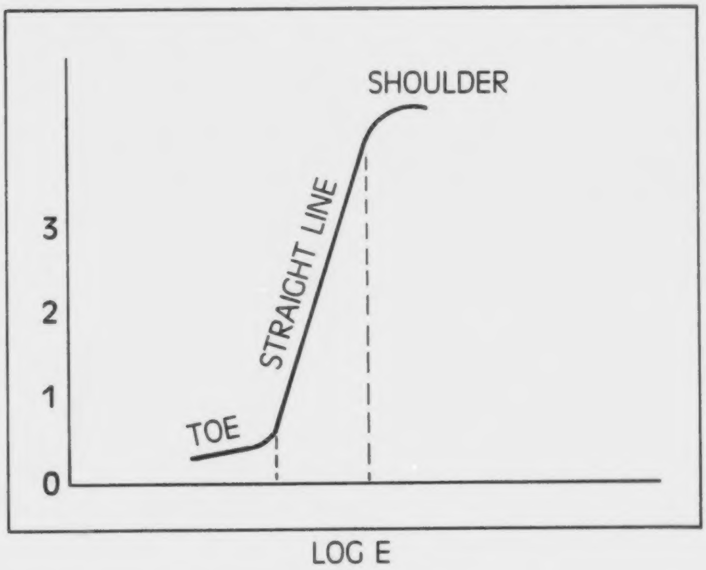


Characteristic Curves Compared

Continuous-Tone Film



High Contrast Film (Lith Film)



ASSIGNMENT SHEET 1 -
SHOWING THE DIFFERENCE BETWEEN HIGH CONTRAST (LITH) FILM AND CONTINUOUS-TONE FILM

1. Place continuous-tone, black and white photograph on camera copyboard next to a paste-up (line copy).

2. Make exposure of this copy on:
   a. Professional copy film (continuous-tone ortho)
   b. Line film (high contrast, lith-ortho, graphic arts film)

3. Process each piece of film according to manufacturer's recommendations.

4. Dry these negatives and compare on light table.

Questions for discussion:

a. What happened to all of the shades of gray in the photo on the lith negative?

b. What do you see on the continuous-tone negative that is undesirable in the area of the paste-up?

c. Can a printing press print these shades and tones?

AS 2

ASSIGNMENT SHEET 2 - SHOWING COLOR SENSITIVITY OF FILM

1. Place line copy on process camera copyboard.
2. Expose this copy to:
   a. Panchromatic lith film
   b. Orthochromatic lith film
3. Process each in high contrast (A and B) developer; fix, wash, and dry.
4. Use a red safelighted darkroom (Caution: do not open pan film box in red safelight.)
5. Compare two negatives on light table.

Questions for discussion:

a. Why did the pan negative develop to a solid black?

b. Why didn't the ortho negative turn solid black?

ANSWERS TO ASSIGNMENT SHEETS 1 AND 2 - SHOWING THE DIFFERENCE BETWEEN HIGH CONTRAST (LITH) FILM AND CONTINUOUS-TONE FILM SHOWING COLOR SENSITIVITY

The instructor will evaluate both assignments by the criteria set in this lesson. Questions for discussion are provided with each assignment; these should be used to help students further understand each activity.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V: EXPOSING WITH A CAMERA

SCOPE OF UNIT:

When photosensitive materials are exposed to image-making light, an invisible image called a latent image is produced. This image is produced whether the exposure is done by camera, by contacting, by scanner or by accident. Unit V explores camera exposures and the variables inherent in the process. Unit V must be taught in conjunction with Unit VI, Processing Photographic Material. Many commonalities exist between Exposing With A Camera and Contacting, Unit VII.

INFORMATION TOPIC: V-2 OR DEMONSTRATION:

EXPOSURE EQUIPMENT AND TOOLS
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Name parts of horizontal process camera.
2. Name two types of process cameras.
3. Define lens focal length (f).
4. Describe the four basic settings of a process camera.
5. Demonstrate the calibration of a densitometer.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Exposing Equipment
2. HO 2: Parts of a Process Camera
3. HO 3: Darkroom Equipment: Safelights and Timers
4. HO 4: Processor and Darkroom Processing Sink
5. HO 5: Camera Operator's Tools

INFORMATIONAL ASSIGNMENT: (Student)

Kagy, Frederick D. and J. Michael Adams. Graphic Arts Photography. North Scituate, MA: Breton Publishers, 1983, ch. 2.

REFERENCES:

Cogoli, John E., et al. Graphic Arts Photography. Pittsburgh, PA: Graphic Arts Technical Foundation, 1981, ch. 4.

INTRODUCTION:

This lesson explores the equipment used in camera exposing and processing, as well as some of the tools, materials and supplies used to control and monitor these processes. Processing and darkroom tools, other than exposure equipment, may be taught in conjunction with Unit VI, Processing Photographic Material.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

OUTLINE: (Key Points)

I. Exposure Equipment

   A. Camera (HO 1)

      1. Vertical camera

         a. Less floor space

         b. Cheaper

         c. Less walking required by operator

         d. Totally contained in darkroom

      2. Horizontal bed camera

         a. Requires more floor space

         b. More expensive

         c. Requires operator to walk inside and outside darkroom

         d. Able to use longer lens for less distortion

         e. Allows darkroom to be used while camera is exposing

         f. Generally higher quality than vertical camera

      3. Horizontal overhead camera

         a. Allows operator access when larger size horizontal camera is needed

         b. Maintains same advantages as horizontal bed camera

         c. Most expensive of process cameras; used only by large companies

   B. Lens - focuses image light onto film (film plane)

      1. Wide angle - used for vertical and short bed horizontal cameras (short focal length)

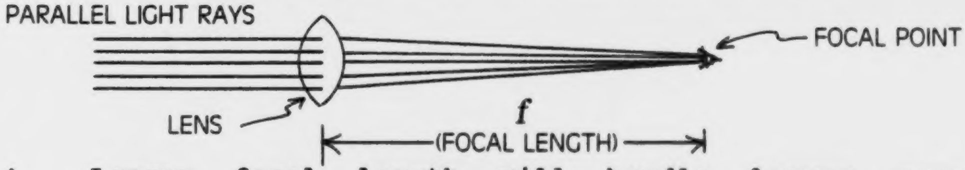
418

2. Long lens (long focal length) - use with horizontal cameras; less distortion

3. Focal length = (f).

    a. Determined by manufacturer

    b. Distance from center of lens to point at which parallel rays entering the lens will converge after passing through the lens



4. Longer focal length will handle larger copy because outside edges of lens coverage are sharper than coverage of short focal length.

5. Care of lens

    a. Clean with lens tissue or soft camel's hair brush.

    b. Never blow on lens or touch it with fingers.

    c. Keep covered when not in use.

    d. Close filter slot when not used.

    e. Store in manufacturer's case when not attached to camera.

6. Aperture - camera control for amount of light

    a. Changes in aperture make the amount of light striking film larger or smaller.

    b. f- stops - each higher f- stop marked on lens barrel allows one-half the amount of light to be transmitted.

EXAMPLE OF CAMERA *f*- STOPS

(Aperture Sizes)

APERTURE	EXPOSURE
f- 8	15 seconds equivalent exposure
f- 11	30 seconds equivalent exposure
f- 16	60 seconds basic exposure
f- 22	120 seconds equivalent exposure
f- 32	240 seconds equivalent exposure
f- 64	480 seconds equivalent exposure

7. Shutter - controls the duration of time in which light hits the film.

   a. Timers are attached electrically to shutters to control exposure time variable.

   b. Some timers are built into camera.

C. Focal plane of process camera

1. Film back (holds film in focal plane)

   a. Visually is vacuum operated to hold film in place by suction

   b. Some less expensive cameras use "sticky-back." Tacky surface holds film in position.

2. Ground glass for focusing

   a. Replaces film back in focal plane

   b. Has clear areas in which image can be examined with magnifier

   c. Has frosted areas in which image can be viewed and measured

D. Copyboard - distance from focal plane adjustable to allow enlargement and reduction

1. Glass cover opens, then closes to clamp copy on board and maintain copy parallel to focal plane.

2. Some copyboards are vacuum operated to hold copy.

E. Lens board - holds lens parallel to focal plane

  1. Distance from lens board to focal plane is adjustable for enlargement and reduction.

  2. Holds aperture as part of lens and permits adjustment of aperture opening in relationship to enlargement/reduction/exposure time

  3. Maintains shutter between lens and film back (focal plane)

F. Other functional parts of the process camera (HO 2)

G. Lighting

  1. Lights of many process cameras travel with the copyboard so that the amount of light falling on the copy is constant, regardless of size setting.
  2. Many vertical cameras require a complex calculation of exposure times. Because the exposure lights are fixed, the effective lighting of the copy fluctuates as the copyboard distance is changed to enlarge and reduce the copy.

  3. Types of light sources for exposure (The kinds of light sources shown, either have been or still are, used for cameras and other exposure devices.)

    a. Incandescent lights

      (1) Weak in blue - white

      (2) Require long exposure

      (3) Darken with use

    b. Quartz - iodine

      (1) Moderate - brighter

      (2) More costly

    c. Carbon arc

      (1) White flame

      (2) Dirty

      (3) Inconsistent - may flicker

      (4) Obsolete

d. Pulsed-xenon (zeenon)

(1) Very bright - white

(2) Short exposure

(3) Long lasting

(4) Expensive

4. Safe use

a. Do not look at lights.

b. Do not touch hot lamps.

c. Do not touch bulbs with fingers; this can cause premature failure.

d. Keep reflectors clean and dust free.

e. Change all lights at same time to maintain constant illumination. (optional)

5. Point source lights are used for contacting. They are low voltage, variable intensity lamps. (See Unit VII)

6. Halftone flashing lamps

a. Use safelight housing.

b. Use 00 yellow filter.

c. Use low wattage bulb (7 1/2 or 15).

d. For shadow exposure

e. Connected to timer

II. Darkroom Equipment

A. Safelights - lights that may be used in the darkroom or other film areas. They will not affect the sensitized material because of their limited color sensitivity range. (HO 3)

1. Follow film manufacturer's recommendations

a. Filter color (number)

b. Wattage of bulb

c. Distance of safelight to sensitized material

2. Construction (type) of safelights

a. Bee-hive safelight

b. Blister safelight

c. Hanging safelight

(NOTE: See Unit V, lesson 3)

B. Timers - electric or mechanical (HO 3)

1. Sweep second - with audible alarm

2. Repeating timer with auto shutoff of equipment

3. Timers should be tested regularly for accuracy against a stopwatch.

C. Integrators - integrating exposure computers

1. Integrator
a. Compensates for light intensity variation

b. Measures units of light that are striking copy

c. Controls shutter

d. Uses photocell to measure light

e. Variances in light intensity can be caused by voltage fluctuations, age of bulbs, dirt on reflectors, etc.

2. Other camera exposure controlling devices

a. Incorporate integrators

b. Measure color temperature of light; this also affects exposure

c. Can control exposures from inside or outside of darkroom

d. Can be programmed

e. Calibrate to show densitometer to control halftone process from start to finish.

D. Exposure calculators

1. Graphic Arts Exposure Computer™ by Eastman Kodak (See Unit V, lesson 6)

        a. Easy to use

        b. Provides accurate method to determine exposure for both line and halftone work

    2. Kodak Halftone Negative Computer™

        a. More complex to use

        b. More accurate through entire range of tones

        c. Compensates for middletone shifts that may be caused by the shadow flash

E. Gray scales

    1. Reflection gray scale

        a. May be used as densitometer

        b. May be photographed with line work to serve as a processing guide (See Unit VI)

        c. May be purchased calibrated or uncalibrated

        d. Kodak Reflection Density Guide™

            (1) Each density step has a small opening through which densities of copy may be viewed and compared to the known density of the guide.

            (2) May be used as a "poor man's densitometer"

            (3) Good test copy for halftone screen calibration

F. Densitometers - used to measure density

    1. Reflection densitometers

        a. Used for reflection copy densities

        b. Reads out in density (may also read out direct percentage of light reflected)

    2. Transmission densitometers

        a. Used for transparent copy densities

        b. Reads out in density of transmitted light; may also read in percentage of light transmitted

3. Types of readouts
    a. Meter
    b. Digital
4. Densities are relative. For example, there is no "perfect white" or "perfect black." All densities are measured in relation to a standard (normally furnished as a plaque of reflective white and black, or as a film strip of transparent clear or opaque black). Densitometers, therefore, must be calibrated to these standards before each use.

G. Processing equipment (HO 4)

1. Processors (See Unit VI)
2. Sinks and accessories
    a. Sinks
        (1) Temperature-controlled, water bath
        (2) Wash units
        (3) Built-in viewers
    b. Trays
        (1) Plastic - cheaper, less noisy
        (2) Stainless steel - control temperature better, noisy
    c. Graduates glass or plastic
    d. Dryers
        (1) Air; no heat, safer, noisy
        (2) Use air and heat; cause film problems, less noisy
        (3) Clothesline with clothespins, slow
        (4) Electric fan, dusty

H. Darkroom entrances

1. Light trap - maze, cheaper
2. Revolving light trap - less floor space

I. Scanners

  1. Expensive
  2. Used predominantly for color separation
  3. May require screen
  4. May use laser-generated dot
  5. Used for about 90% of all color separation work

J. Other equipment and tools

  1. Magnifiers (HO 5)
     a. Linen tester
     b. Tripod
     c. Swivel stand
     d. Engraver's loupe
     e. Swivel
     f. Pocket microscope
     g. All of above are available in a variety of sizes, powers and costs.
  2. Halftone screens
     a. Glass - etched cross line
        (1) Expensive
        (2) Technical use is difficult.
        (3) Uses different principle than contact screens
        (4) Obsolete
     b. Contact screens
        (1) Magenta - long range
            (a) Control range with cc (color correcting) filters
            (b) Predominantly for black and white work
            (c) May require bump

(2) Gray - short range

    (a) Used for black and white originals

    (b) Used for direct screen color separation

    (c) Negative screen has built-in highlight bump.

    (d) Positive screen is used for making halftone positives from continuous-tone negatives; it requires highlight bump.

    (e) Diffusion transfer gray screen keeps shadow dot on diffusion transfer screened halftone prints open for reshooting as line work.

c. Dot patterns of screens

    (1) Square dot is typical.

    (2) Elliptical dot has better middletones.

d. Screen rulings

    (1) Lines of dots per inch

        (a) 65, 85, 100, 120, 133, 150, 200

        (b) Higher rulings for better detail; most nearly represent continuous-tone original

        (c) Low rulings for coarse, rough, absorbent paper
        (d) Higher rulings for high quality, smooth, coated paper

e. Care of screens

    (1) Clean with photo chamois.

    (2) Use special contact screen cleaner.

    (3) Store in folder.

    (4) Handle only by edges.

    (5) Glass screens are very expensive and fragile.

f. Structure

(1) Continuous-tone film

(2) Vignetted dots

(a) Each dot shades from solid core to faded out, pale edge.

(b) Greater light intensity (more reflected exposure) penetrates deeper into dark core of dot to result in larger negative dot on film.

3. Film punches

a. Use to position film and flats in register. (See Unit VII)

b. Match camera, scanner and contact frame pins.

4. Vacuum contact frames (See Unit VII)

5. Silver recovery units retrieve silver from spent fixer.

K. Filters

1. Photomechanical - used for cameras, very high optical quality

2. CC (color correcting) for magenta contact screens

3. Colored filters change color of copy to make it match value sensitivity of film.

4. ND - neutral density; change amount of light (See Unit VII for use and values in contacting.)

III. Summary and Conclusion

A. Exposure equipment

B. Darkroom equipment

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V: EXPOSING WITH A CAMERA

INTERACTION ITEMS:

1. Why does more light through a halftone screen make bigger dots on the film?
2. If you were going to set up a darkroom for a small shop, what kind of camera would you purchase? Why?
3. When the exposure time on the camera is so short that you can't control it, what can you do to lengthen it?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. It is suggested that the instructor arrange for field trips which give students the opportunity to see kinds of equipment not readily available in the lab. Some particular pieces of equipment the student should see in operation are:

   a. Open face vacuum frame
   b. Filter selector
   c. Scanner
   d. Automatic processors
   e. Overhead process camera
   f. Vertical or horizontal camera, whichever is not in the lab
   g. Film dryer
   h. Light integrators; exposure control computers
   i. Magenta and glass screens
   j. Silver recovery systems

   The student should be able to describe which lab equipment can accomplish the same tasks as these larger and more sophisticated pieces of equipment accomplish.

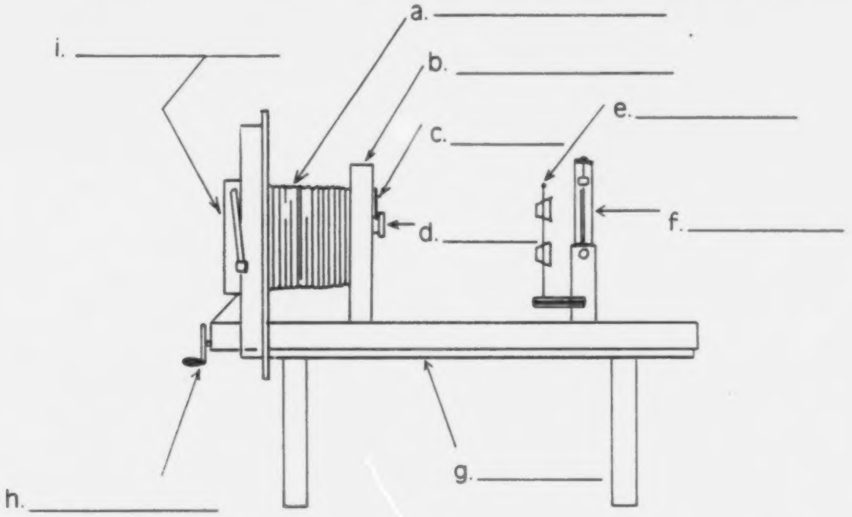
LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

EVALUATION ITEMS:

1. Name the parts of this camera in the blanks provided.



This is an illustration of a j. ______________ k. ___________ camera.

2. Name two types of process cameras.

3. Define lens focal length.

4. What are the four controls that must be set when preparing the process camera to make a shot?

5. Name at least two types of contact screens.

6. Name at least two advantages that a vertical camera has over a horizontal camera.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

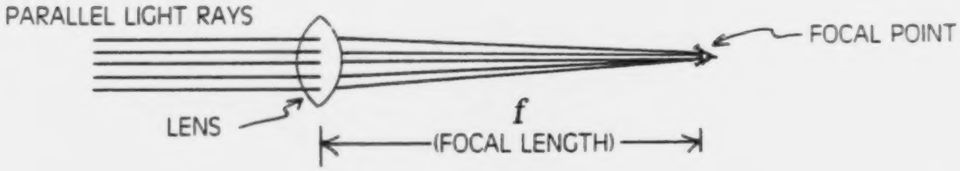
ANSWERS TO EVALUATION ITEMS:

1. Parts of a camera
   a. bellows
   b. lens board
   c. aperture adjustment
   d. lens
   e. lights
   f. copyboard
   g. bed
   h. size adjustment (lens and copy)
   i. film back (focal plane)
   j. horizontal
   k. process

2. 1. Horizontal
      a. bed
      b. overhead
   2. Vertical

3. Lens focal length is the distance from the center of the lens to a point at which parallel rays entering the lens will converge after passing through the lens.

   (If preferred, the student may draw a diagram and label the focal length.)

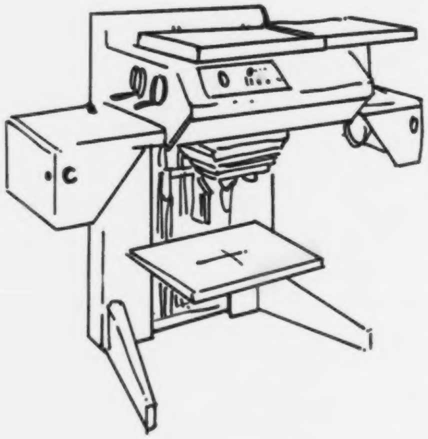


4. a. copyboard distance - set by percentage size
   b. lens/board distance - set by percentage size
   c. aperture - set by percentage size
   d. exposure time - set timer in seconds

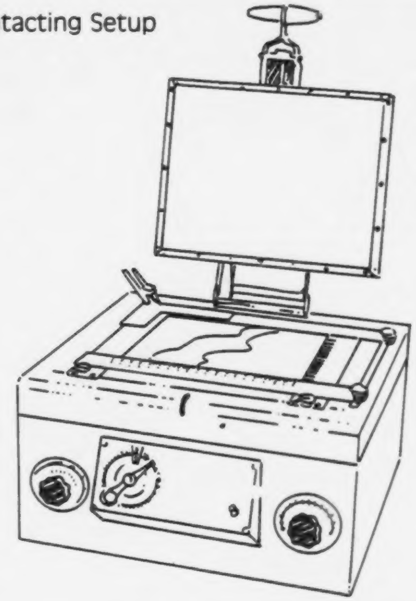
5. a. gray contact screen
   b. magenta contact screen

6. a. cheaper
   b. less floor space used
   c. less walking required

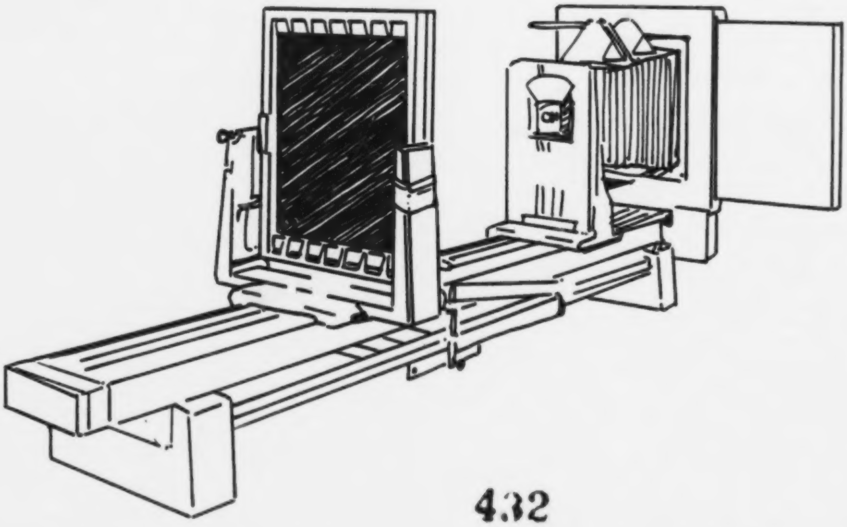
Exposing Equipment



Vertical Camera



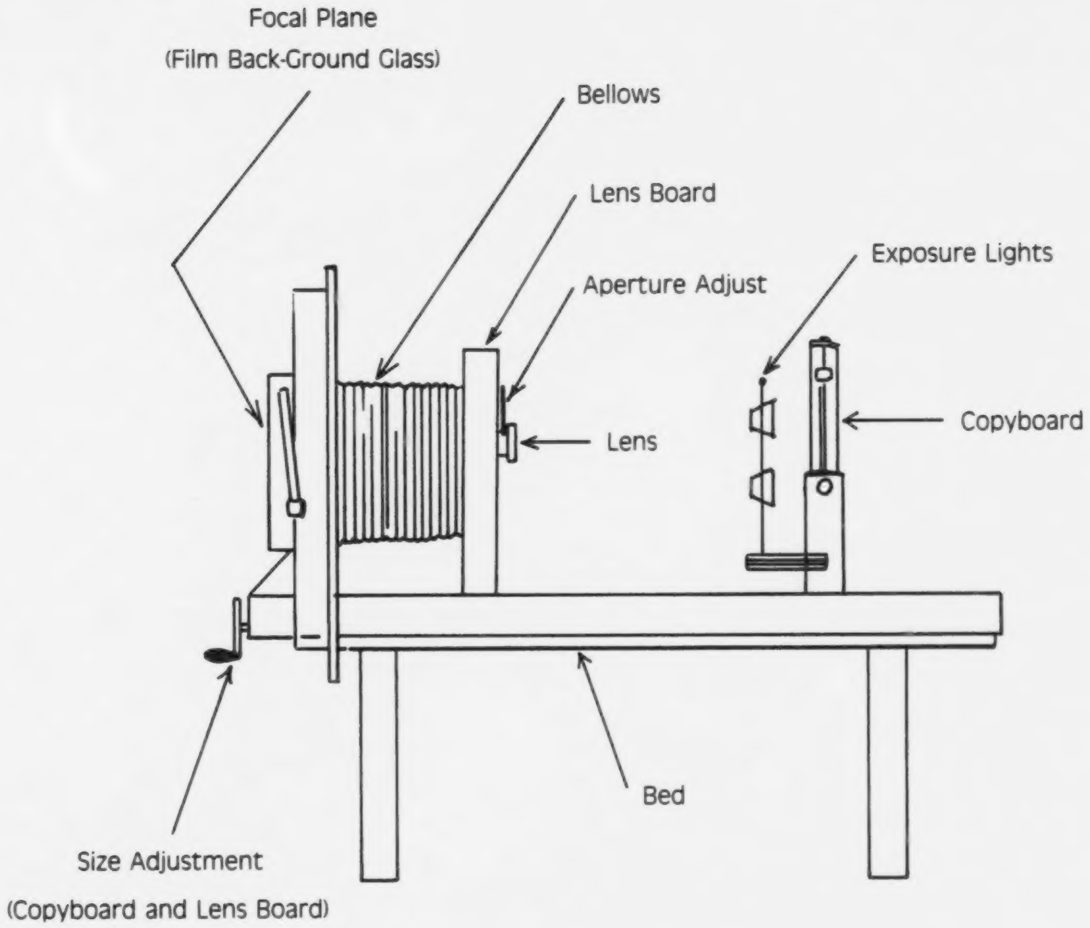
Contacting Setup



Horizontal Camera

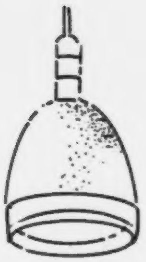
HO 2

Parts of Process Camera

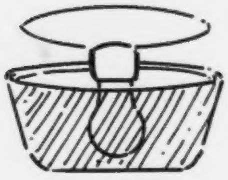

Focal Plane
(Film Back-Ground Glass)
Bellows
Lens Board
Aperture Adjust
Exposure Lights
Copyboard
Lens
Bed
Size Adjustment
(Copyboard and Lens Board)

Darkroom Equipment: Safelights and Timers

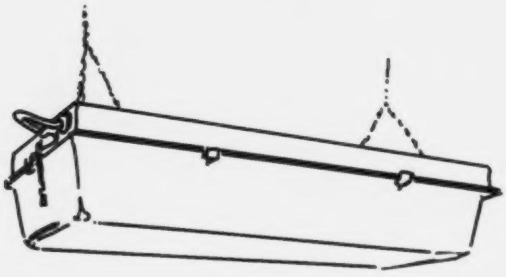
SAFELIGHTS



Bee-Hive Safelight

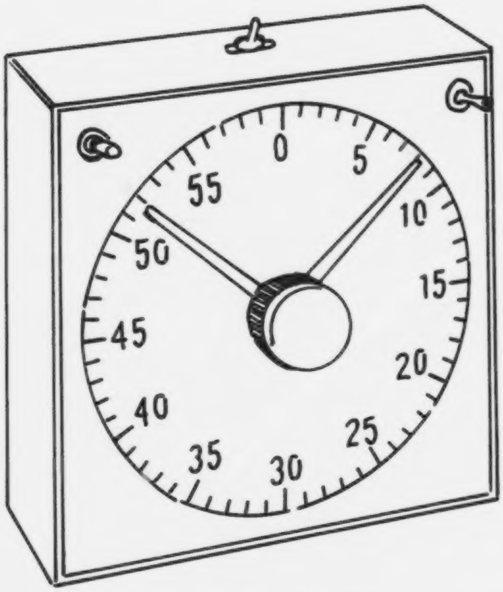


Blister Safelight



Hanging Safelight

TIMERS


0
5
10
15
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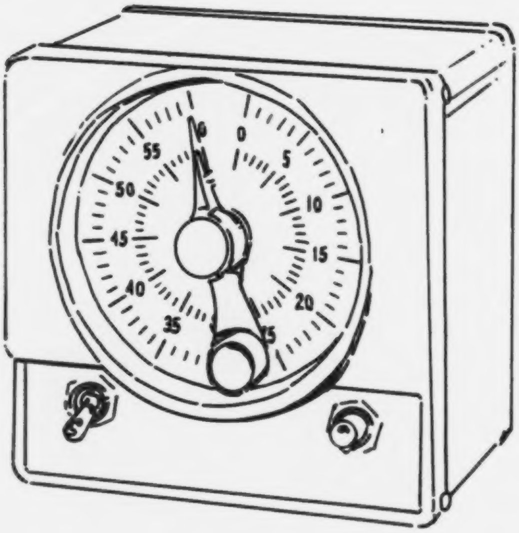
45
50
55

Sweep Second Timer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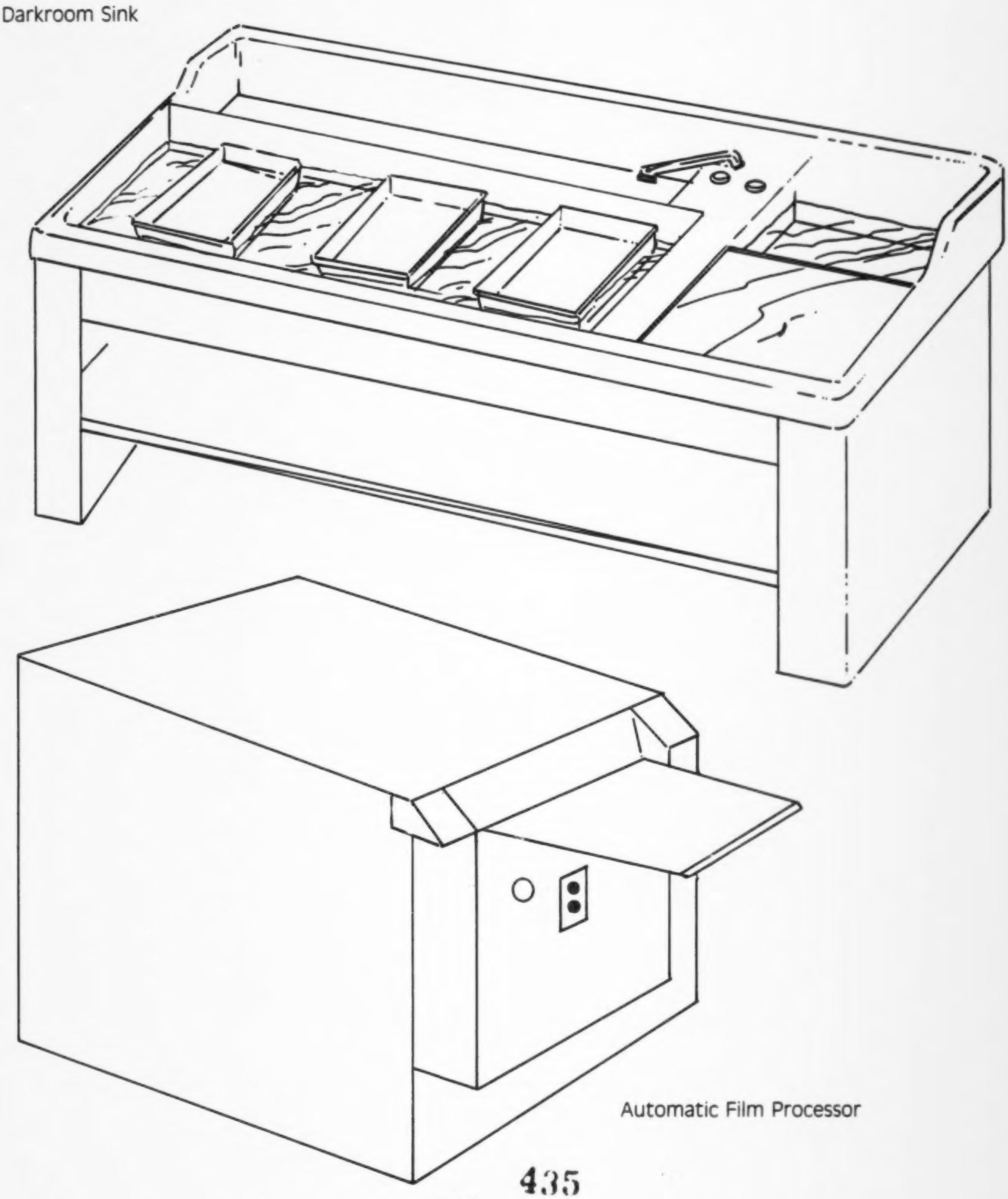
Repeating Timer (Electric Shutoff)

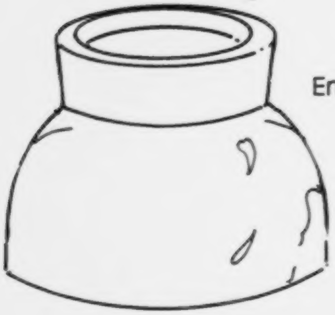
HO 4

Processor and Darkroom Processing Sink

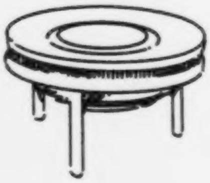

Darkroom Sink
Automatic Film Processor

Camera Operator's Tools

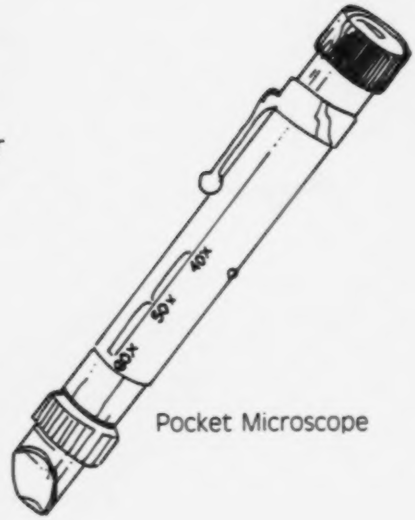
Magnifiers



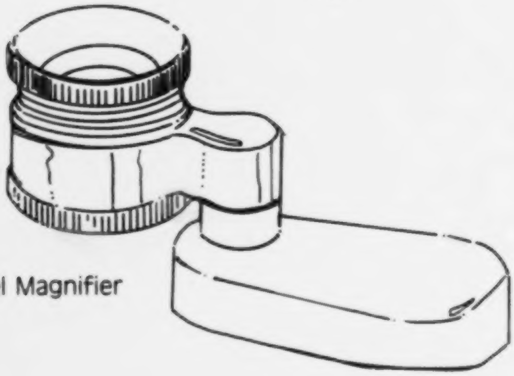
Engraver's Lupe



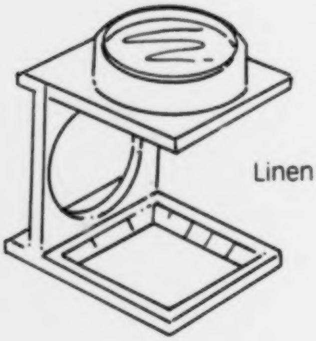
Tripod Magnifier



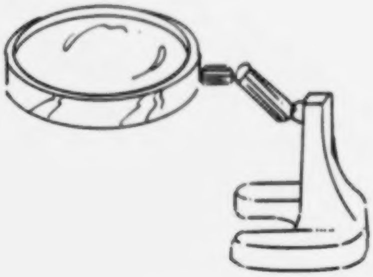
Pocket Microscope



Swivel Magnifier



Linen Tester



Swivel Stand Magnifier

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

SCOPE OF UNIT:

When photosensitive materials are exposed to image-making light, an invisible image called a latent image is produced. This image is produced whether the exposure is done by camera, by contacting, by scanner or by accident. Unit V explores camera exposures and the variables inherent in the process. Unit V must be taught in conjunction with Unit VI, Processing Photographic Material. Many commonalities exist between Exposing With A Camera and Contacting, Unit VII.

INFORMATION TOPIC: OR DEMONSTRATION: V-3

TESTING SAFELIGHTS
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Determine if installed darkroom safelights are safe to use with the sensitized materials intended for use in the darkroom.
2. Locate and consult manufacturer's recommendations on safelight filter type, light wattage, and distance from work area.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. Light Sensitive Material
2. Darkroom
3. Processing Chemicals
4. White Lights
5. Safelights
6. Opaque Cardboard
7. Keys/coins
8. Film

INFORMATIONAL ASSIGNMENT: (Student)

Cogoli, John E., et al. Graphic Arts Photography. Pittsburgh, PA: Graphic Arts Technical Foundation, 1981, ch. 1.

REFERENCES:

INTRODUCTION:

This lesson provides the student with a practical, quick method for checking the safeness of darkroom safelights.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

STEPS OF PROCEDURE:

1. Determine which light sensitive materials are to be regularly used in the darkroom. Locate a box of each.

2. Prepare the appropriate processing chemicals for the above materials.

3. Turn off all white lights and inspect darkroom for white light leaks. These must be blocked before safelights can be tested. Turn on safelights to be tested.

4. On countertop, or a normal working-height shelf in the darkroom, lay out a sheet of each material to be handled under safelights.

5. Cover about 1/3 of each sheet with opaque cardboard. Lay keys or coins on the uncovered portions.

6. Allow material to remain for 15 minutes.

7. Remove cardboard and keys/coins; process the material as recommended by the manufacturer. Dry.

8. Remove film to a light table and inspect. If there is a discernable density difference between the covered and uncovered portions, or if an image of the keys or coins is visible, the safelight is not safe. It can be made safe.

   a. The filter should be the proper type for the processed material.

   b. Safelight should be checked for white light leaks.

   c. Wattage of safelight is too high and should be reduced.

   d. Safelight is too close to work surface and distance should be increased.

   e. There are too many safelights in the room.

9. One or more of the above may be necessary to make the safelights in your darkroom safe.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

INTERACTION ITEMS:

1. Name five problems that could cause the darkroom to be unsafe for light sensitive material.

2. Describe the procedure for checking the safelights.

3. Where do you find the recommendations of the film manufacturer concerning such things as:

    a. light wattage of safelight?
    b. distance of safelight to work surface?
    c. required safelight filter?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

EVALUATION ITEMS: NAME OF STUDENT:

TESTING SAFELIGHTS

EQUIPMENT:

1. Light Sensitive Material
2. Darkroom
3. Processing chemicals
4. White lights
5. Safelights
6. Opaque cardboard
7. Keys/coins
8. Film

DID THE STUDENT:	YES	NO
1. Determine which light sensitive materials are to be regularly used in the darkroom. Locate a box of each.		
2. Prepare the appropriate processing chemicals for above materials.		
3. Turn off all white lights and inspect darkroom for white light leaks. These must be blocked before safelights can be tested. Turn on safelights to be tested.		
4. On countertop, or a normal working-height shelf in the darkroom, lay out a sheet of each material to be handled under safelights.		
5. Cover about 1/3 of each sheet with opaque cardboard. Lay keys or coins on the uncovered portions.		
6. Allow material to remain for 15 minutes.		
7. Remove cardboard and keys/coins; process the material as recommended by the manufacturer. Dry.		

DID THE STUDENT:	YES	NO
8. Remove film to a light table and inspect. If there is a discernable density difference between the covered and uncovered portions, or if an image of the keys or coins is visible, the safelight is not safe. It can be made safe. a. The filter should be the proper type for the processed material.		
b. Safelight should be checked for white light leaks.		
c. Wattage of safelight is too high and should be reduced.		
d. Safelight is too close to work surface and distance should be increased.		
e. There are too many safelights in the room.		

The student has satisfactorily completed the procedure "TESTING SAFELIGHTS" according to the steps outlined.

Instructor's Signature
(Verifying Satisfactory Completion)

Date

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

SCOPE OF UNIT:

When photosensitive materials are exposed to image-making light, an invisible image called a latent image is produced. This image is produced whether the exposure is done by camera, by contacting, by scanner or by accident. Unit V explores camera exposures and the variables inherent in the process. Unit V must be taught in conjunction with Unit VI, Processing Photographic Material. Many commonalities exist between Exposing With A Camera and Contacting, Unit VII.

INFORMATION TOPIC: OR DEMONSTRATION: V-4

USING THE DENSITOMETER
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Calibrate reflection and transmission densitometers.
2. Measure the amount of reflected (or transmitted) density of a particular area of reflection (or transmission) copy.
3. Determine the density range of a piece of reflection (or transmission) copy.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Density Range Worksheet
2. Opaque Gray Scale
3. Continuous-Tone Photograph
4. Tissue
5. Reflection Densitometer
6. Density Range Worksheet

INFORMATIONAL ASSIGNMENT: (Student)

Kagy, Frederick D. and J. Michael Adams. Graphic Arts Photography. North Scituate, MA: Breton Publishers, 1983, ch. 4.

REFERENCES:

Cogoli, John E., et al. Graphic Arts Photography. Pittsburgh, PA: Graphic Arts Technical Foundation, 1981, ch. 4.

INTRODUCTION:

In order to understand the process of making line negatives and halftones, the student should understand the basics of sensitometry (densitometry) and the operation of the equipment (densitometers).

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

STEPS OF PROCEDURE:

EXERCISE 1:

1. Place an opaque gray scale next to a continuous-tone photograph. Shift the scale around and locate a spot (tone) on the photo to match each step of the gray scale.
2. Place a tissue over the photo and lightly pencil-in the density of each spot of the photo as read from the gray scale.
3. Record the highest density (shadow area) on the record sheet (HO 1) and record the lowest density (highlight area) below it. Subtract the highlight area density from the shadow area density.
4. The difference between the lightest and darkest area is known as the copy density range. It is a way to assign a numerical value to contrast.

EXERCISE 2:

1. Using a reflection densitometer, calibrate it according to the manufacturer's instructions. Your instructor will demonstrate this procedure.
2. Measure the same spots on the photo used in Exercise 1 with the densitometer. Record these densities on a tissue overlay.

   Questions:

   a. Are the densities recorded with the densitometer the same as the densities recorded when photo is compared to a gray scale?
   b. To what do you attribute any difference?
   c. Which readings would you expect to be most accurate?
   d. Which method of density measurement would you expect to be most consistent?
3. Record the highlight (lowest) density and the shadow (highest) density on the second form of the density worksheet (HO 1).

4. Determine the numerical difference between these and record this density range.

   Questions:

   a. Does the density range determined from the gray scale procedure differ from the range obtained by using a densitometer?

   b. To what do you attribute this difference (if any)?

5. Save this data worksheet for a future lesson.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

INTERACTION ITEMS:

1. What is another name for density range?
2. Describe how a gray scale is like a densitometer.
3. Why must the densitometer be calibrated?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

EVALUATION ITEMS: NAME OF STUDENT: ____________

USING THE DENSITOMETER

EQUIPMENT:

1. Opaque Gray Scale
2. Continuous-Tone Photograph
3. Tissue
4. Reflection Densitometer
5. Density Range Worksheet

DID THE STUDENT:	YES	NO
EXERCISE 1: 1. Place an opaque gray scale next to a continuous-tone photograph. Shift the scale around and locate a spot (tone) on the photo to match each step of the gray scale.		
2. Place a tissue over the photo and lightly pencil-in the density of each spot of the photo as read from the gray scale.		
3. Record the highest density (shadow area) on the record sheet (HO 1) and record the lowest density (highlight area) below it. Subtract the highlight area density from the shadow area density.		
EXERCISE 2: 1. Using a reflection densitometer, calibrate it according to the manufacturer's instructions.		
2. Measure the same spots on the photo used in Exercise 1 with the densitometer. Record these densities on a tissue overlay.		
3. Record the highlight (lowest) density and the shadow (highest) density in the second form of the density worksheet (HO 1).		

DID THE STUDENT:	YES	NO
4. Determine the numerical difference between these and record this density range.		
5. Save this data worksheet for a future lesson.		

The student has satisfactorily completed the procedure "USING THE DENSITOMETER" according to the steps outlined.

Instructor's Signature
(Verifying Satisfactory Completion)

Date

Density Range Worksheet

Record the data determined in Exercises 1 and 2. Save this sheet for Lesson 7.

Exercise 1:

Determining density range using gray scale method:

Copy Shadow Density ____________
(subtract) —Copy Highlight Density ____________
____

(difference) Copy Density Range ____________

Exercise 2:

Determining density range using densitometer method:

Copy Shadow Density ____________
(subtract) —Copy Highlight Density ____________
____

(difference) Copy Density Range ____________

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V: EXPOSING WITH A CAMERA

SCOPE OF UNIT:

When photosensitive materials are exposed to image-making light, an invisible image called a latent image is produced. This image is produced whether the exposure is done by camera, by contacting, by scanner or by accident. Unit V explores camera exposures and the variables inherent in the process. Unit V must be taught in conjunction with Unit VI, Processing Photographic Material. Many commonalities exist between Exposing With A Camera and Contacting, Unit VII.

INFORMATION TOPIC: OR DEMONSTRATION: V-5

DETERMINING EXPOSURE FOR LINEWORK
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Determine proper exposure time for making a line shot of normal line copy.
2. Alter standard exposure time to compensate for unusual copy.
3. Determine gray scale step to use as a guide for development of linework.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Types of Line Copy
2. HO 2: Step-Off Procedure
3. HO 3: Line Negative Evaluation
4. Copy
5. Copyboard
6. Lights
7. Camera
8. Light Meter
9. High-Contrast Ortho Film
10. Strip of Black Paper
11. Opaque Paper
12. Ruler
13. Gray Scale Guide

INFORMATIONAL ASSIGNMENT: (Student)

Kagy, Frederick D. and J. Michael Adams. Graphic Arts Photography. North Scituate, MA: Breton Publishers, 1983, ch. 7.

REFERENCES:

Cogoli, John E., et al. Graphic Arts Photography. Pittsburgh, PA: Graphic Arts Technical Foundation, 1981, ch. 9.

INTRODUCTION:

Evaluating line negatives and making procedural adjustments to improve the product is an important skill that separates an ordinary camera operator from a technician. This lesson requires the student to make crucial judgments and act on them.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

STEPS OF PROCEDURE:

1. Select test copy with this criteria:

   a. Line copy should be made of dense black images: blobs, marks, spots, lines, type, etc. on bright white background. (HO 1)

   b. Some copy should be small, delicate type with serifs.

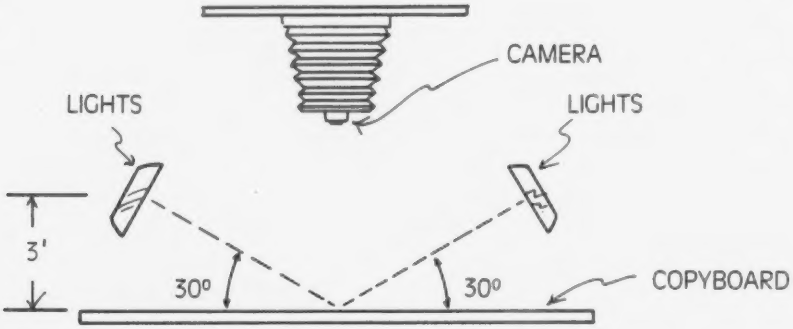
   c. Image should cover most of sheet (copy) uniformly.

   d. Copy should be considered best available.

2. Center copy on copyboard and turn copyboard to face lens.

3. Adjust lights:

   a. Customary practice is to adjust the position of the lights approximately 3' from the copyboard at 30°.



   b. It may be necessary to readjust lights to provide even illumination to the copyboard. Use a light meter to assist with this and lock the lights into position. If lights do not lock, adjust them. Then mark the lights so it can be easy to properly reposition them.

4. Set camera lens board and copyboard for 100% (same size) reproduction. This may be done in darkroom. Some cameras are adjusted from the gallery (outside the darkroom).

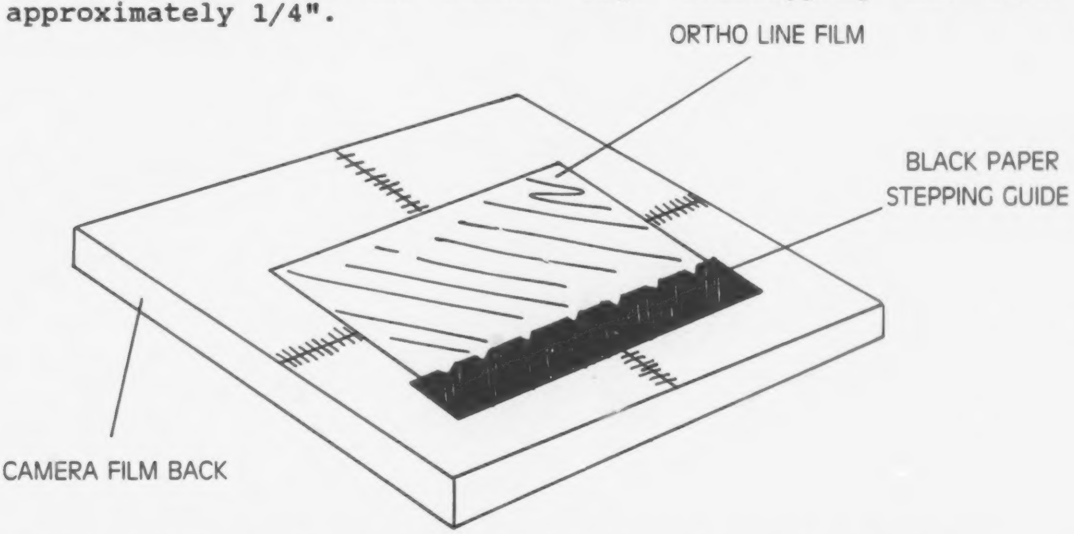
5. Set aperture at *f*-22 for 100%. It may be necessary to adjust this later, however, *f*-22 is usually two or three stops from wide open and will probably provide exposures lengthy enough to control.

6. Set shutter timer for five seconds. (On very short-bed, wide angle cameras it may be necessary to shorten this test exposure.)

7. Remove a sheet of high-contrast, ortho film from the box (5 x 7 or 8 x 10) and center on the film back. Turn on vacuum. Be sure the emulsion side of the film faces the lens when the film back is closed.

   Hint: The dark side of the film is the antihalation dye and is on the base side. The lighter side is the emulsion side. Remember: "Light side is light sensitive."

8. Use a strip of black paper with small nicks every half-inch as a guide to step-off. Place this guide along the length of the film with the nicked edge overlapping the film approximately 1/4".



9. Close camera back and make a five second overall exposure.

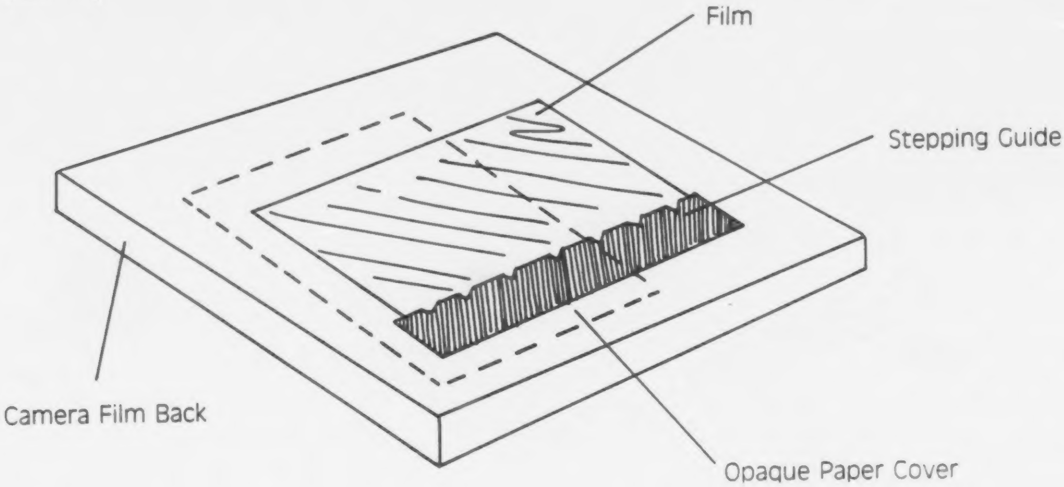
10. Open camera back (leave vacuum on, do not move film). Place a piece of opaque paper over all of the film except the first 1/2" (first nick in guide).

11. Close camera and make five second exposure. (First step has now been exposed 10 seconds.)

12. Open camera - move opaque paper to second step (second nick in guide).

13. Close camera - make five second exposure. (First step now has 15 second exposure; second step is 10 seconds.)

14. Repeat process until eight or nine steps have been exposed. Count each exposure to help determine exposure times later. (HO 2)



15. Remove opaque paper cover, stepping guide and film. Turn off vacuum.

16. Process film while keeping all variables constant and controlled. (See Unit VI, lesson 1)

17. Dry negative and examine it on a light table. Compare it to original copy.

18. Count the steps. There should be 1/4" of the negative edge clear. One large step represents the overall exposure of five seconds and each succeeding step is incremented by five seconds. Label the exposure time of each step in the clear edge of the film.

19. Examine the negative for the best step. This will be the exposure that most nearly matches the positive image of the copy.

20. Overexposed steps will have a sharpened image. Thin strokes of letters will be very thin or broken. Fine, square strokes will be sharpened. Typeface will print lighter than original. (HO 3)

21. Underexposed steps will have a blunt, rounded image. Type will print bolder than original. Background (nonimage) density will not be opaque. Slide a ruler or other flat, opaque object between negative and light table to check negative opacity. (See HO 3 for example.)

22. Replace copy in copyboard and add a gray scale sensitivity guide on top of the copy. Close copyboard and make exposure using the time determined in step-off test as ideal.

23. Process film as before, but examine the gray scale (emulsion up) while the film is in the stop bath (before fixing).

24. The processing of negatives of ideal copy should be stopped when the gray scale looks like the scale of the test. (Usually at Step 4: approximately a density of .30 to .35.)

25. Copy that varies from the ideal may require alterations in the development and/or processing.

    a. Copy with a lighter image will require less development. Stop the gray scale sooner.

    b. Copy with dirty or darkened background will require more development. Allow the gray scale to turn darker.

26. All future negatives should include a gray scale in the border area of the copy to serve as a development guide. This guide will compensate for lack of control of the variables. (See Unit VI)

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

INTERACTION ITEMS:

1. Why should we always include a gray scale on the copy when shooting line work?
2. Why do we make an exposure step-off? Why don't we just make several trial exposures to determine best exposure time?
3. After determining best exposure time with the step-off procedure, why do we make another shot with the gray scale included with the copy?
4. Describe the qualities of good line copy.
5. At what angle should the light usually hit the copyboard?
6. Why is it critical to have the lights in the same position and at the same distance for each exposure?
7. Which side (light or dark) of the film is the emulsion side?
8. Describe an underexposed or underdeveloped line negative.
9. Describe an overdeveloped line negative.

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

EVALUATION ITEMS: NAME OF STUDENT:_______________

DETERMINING EXPOSURE FOR LINEWORK

EQUIPMENT:

1. Copy
2. Copyboard
3. Lights
4. Camera
5. Light Meter
6. High-Contrast Ortho Film
7. Strip of Black Paper
8. Opaque Paper
9. Ruler
10. Gray Scale Guide

DID THE STUDENT:	YES	NO
1. Select test copy with this criteria: a. Line copy should be made of dense black images: blobs, marks, spots, lines, type, etc. on bright white background.		
b. Some copy should be small, delicate type with serifs.		
c. Image should cover most of sheet (copy) uniformly.		
d. Copy should be considered best available.		
2. Center copy on copyboard and turn copyboard to face lens.		
3. Adjust lights: a. Customary practice is to adjust the position of the lights approximately 3' from the copyboard at 30°.		

DID THE STUDENT:	YES	NO
b. It may be necessary to readjust lights to provide even illumination to the copyboard. Use a light meter to assist with this and lock the lights into position. If lights do not lock, adjust them. Then mark the lights so it can be easy to properly reposition them.		
4. Set camera lens board and copyboard for 100% (same size) reproduction.		
5. Set aperture at *f*-22 for 100% It may be necessary to adjust this later.		
6. Set shutter timer for five seconds. (On very short-bed, wide angle cameras it may be necessary to shorten this test exposure.)		
7. Remove a sheet of high-contrast, ortho film from the box (5 x 7 or 8 x 10) and center on the film back. Turn on vacuum. Be sure the emulsion side of the film faces the lens when the film back is closed.		
8. Use a strip of black paper with small nicks every half-inch as a guide for step-off. Place this guide along the length of the film with the nicked edge overlapping the film approximately 1/4".		
9. Close camera back and make a five second overall exposure.		
10. Open camera back (leave vacuum on, do not move film). Place a piece of opaque paper over all of the film except the first 1/2" (first nick in guide).		
11. Close camera and make five second exposure. (First step has now been exposed 10 seconds.)		
12. Open camera - move opaque paper to second step (second nick in guide).		
13. Close camera - make five second exposure. (First step now has 15 second exposure; second step is 10 seconds.)		
14. Repeat process until eight or nine steps have been exposed. Count each exposure to help determine exposure times later.		

DID THE STUDENT:	YES	NO
15. Remove opaque paper cover, stepping guide and film. Turn off vacuum.		
16. Process film while keeping all variables constant and controlled.		
17. Dry negative and examine it on a light table. Compare it to original copy.		
18. Count the steps. There should be 1/4" of the negative edge clear. One large step represents the overall exposure of five seconds and each succeeding step is incremented by five seconds. Label the exposure time of each step in the clear edge of the film.		
19. Examine the negative for the best step. This will be the exposure that most nearly matches the positive image of the copy.		
20. Overexposed steps will have a sharpened image. Thin strokes of letters will be very thin or broken. Fine, square strokes will be sharpened. Typeface will print lighter than original.		
21. Underexposed steps will have a blunt, rounded image. Type will print bolder than original. Background (nonimage) density will not be opaque. Slide a ruler or other flat, opaque object between negative and light table to check negative opacity.		
22. Replace copy in copyboard and add a gray scale sensitivity guide on top of the copy. Close copyboard and make exposure using the time determined in step-off test as ideal.		
23. Process film as before, but examine the gray scale (emulsion up) while the film is in the stop bath (before fixing).		
24. The processing of negatives of ideal copy should be stopped when the gray scale looks like the scale of the test.		
25. Copy that varies from the ideal may require alterations in the development and/or processing. a. Copy with a lighter image will require less development. Stop the gray scale sooner.		

DID THE STUDENT:	YES	NO
b. Copy with dirty or darkened background will require more development. Allow the gray scale to turn darker.		
26. All future negatives should include a gray scale in the border area of the copy to serve as a development guide. This guide will compensate for lack of control of the variables.		

The student has satisfactorily completed the procedure "DETERMINING EXPOSURE FOR LINEWORK" according to the steps outlined.

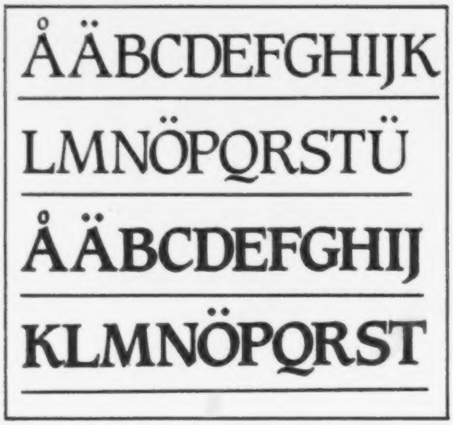
____
Instructor's Signature
(Verifying Satisfactory Completion)

____
Date

461

Types of Line Copy

Type



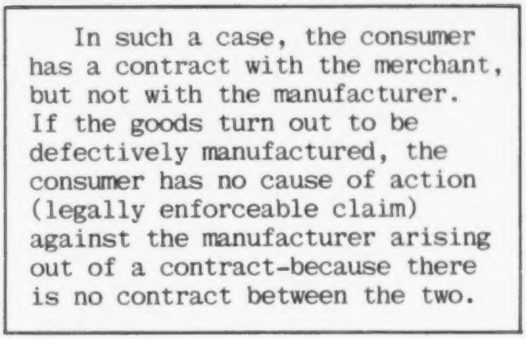
ÅÄBCDEFGHIJK

LMNÖPQRSTÜ

ÅÄBCDEFGHIJ

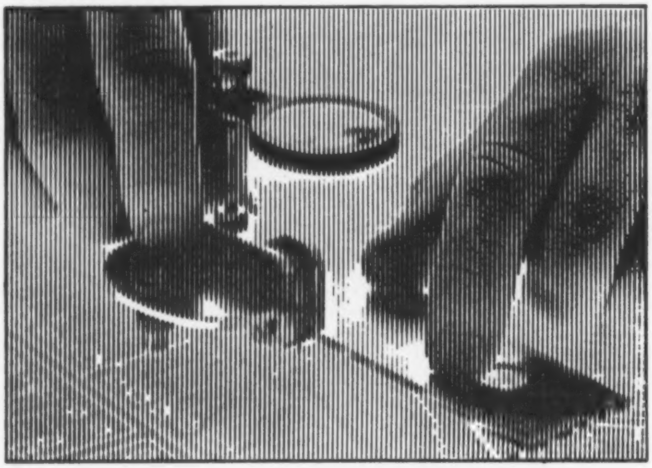
KLMNÖPQRST

Typewriter

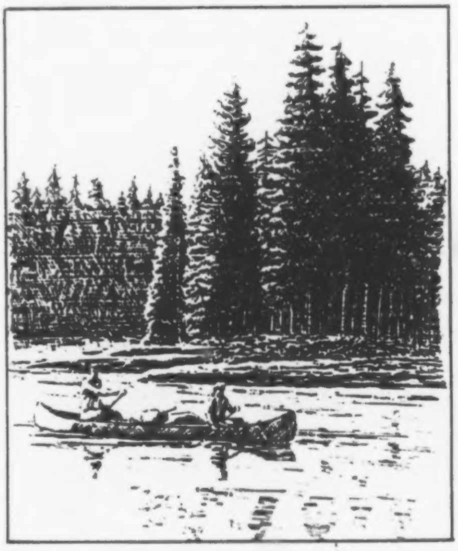


In such a case, the consumer has a contract with the merchant, but not with the manufacturer. If the goods turn out to be defectively manufactured, the consumer has no cause of action (legally enforceable claim) against the manufacturer arising out of a contract-because there is no contract between the two.

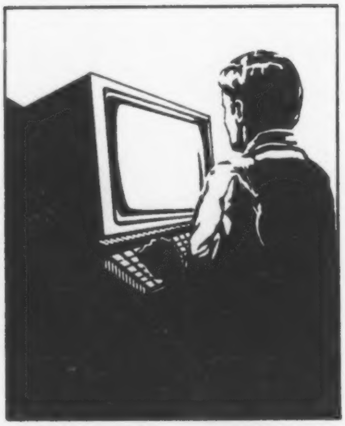
Screened Prints



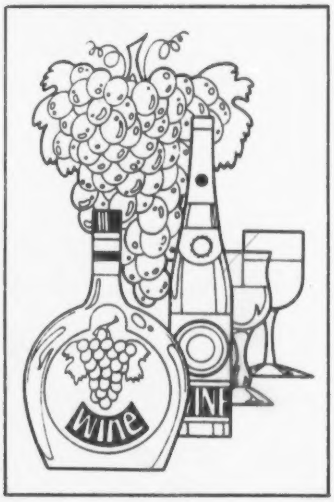
Fine Lines



Large Solids



Line Drawings

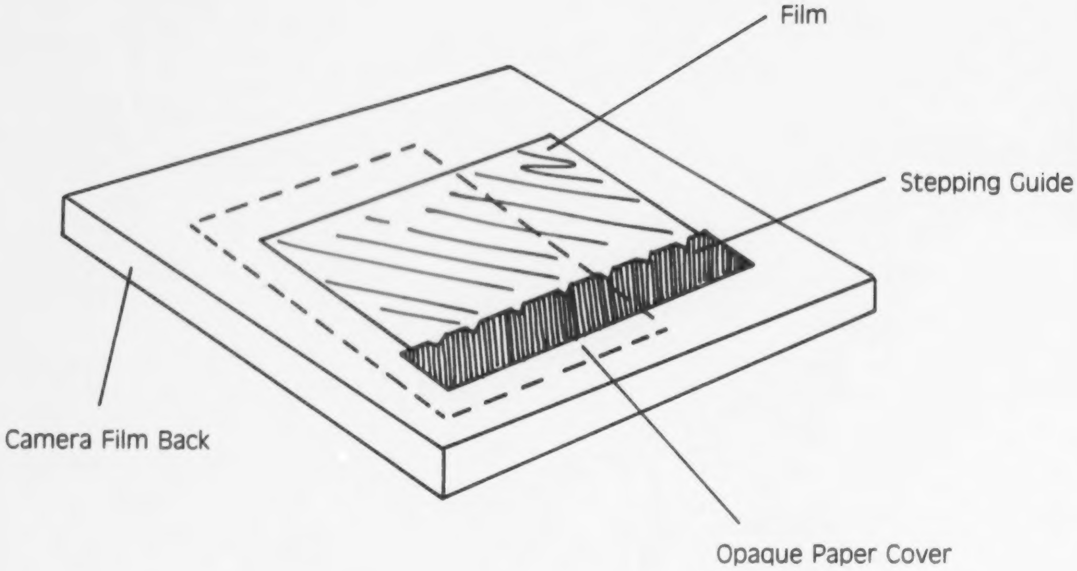


Step-Off Procedure

Step-Off Procedure:

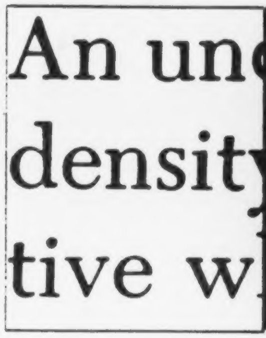
1. Clean copyboard of camera - set camera lens board, copyboard, and aperture at 100%. Use *f-22* aperture.
2. Set exposure time at five seconds.
3. Check and adjust lighting position.
4. Center test copy on copyboard; close cover; position parallel to film back.
5. Center sheet of high contrast, ortho film on film back with emulsion facing lens. (Emulsion is light side.)
6. Position stepping guide strip with nicks along one edge of film with about ¼" overlap.
7. Close vacuum back and make five second overall exposure.
8. Open back and cover film except for first step. Use nicks on the stepping guide for each step. Use opaque paper for cover sheet.
9. Close back and expose step for five seconds.
10. Open back and move cover paper to next nick. Close and repeat exposure.
11. Repeat this step-off procedure for eight or nine steps.
12. Remove film from camera and process.
13. Examine and evaluate negative for best time.

Making Step-Off


Film
Stepping Guide
Camera Film Back
Opaque Paper Cover

Line Negative Evaluation

ORIGINAL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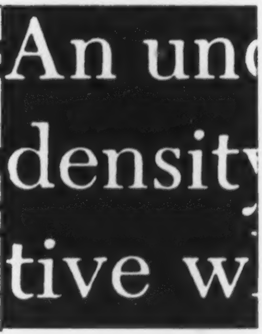
CORRECT EXPOSURE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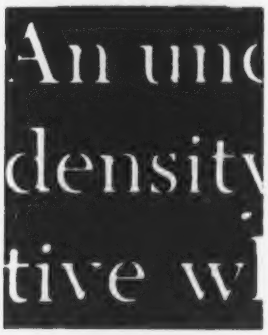
Overexposure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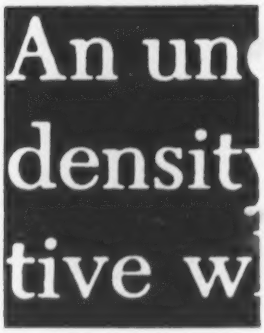
Underexposure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LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

SCOPE OF UNIT:

When photosensitive materials are exposed to image-making light, an invisible image called a latent image is produced. This image is produced whether the exposure is done by camera, by contacting, by scanner or by accident. Unit V explores camera exposures and the variables inherent in the process. Unit V must be taught in conjunction with Unit VI, Processing Photographic Material. Many commonalities exist between Exposing With A Camera and Contacting, Unit VII.

INFORMATION TOPIC: OR DEMONSTRATION: V-6

DETERMINING BASIC HALFTONE EXPOSURE TIMES
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Determine basic density range of a given halftone screen and the basic flash time.
2. Explain the purpose of the flash exposure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Halftone Dot Evaluation Chart
2. HO 2: Screen Test Worksheet
3. HO 3: Halftone Worksheet
4. AS 1: Shooting Halftones
5. Gray Halftone Contact Screen
6. 8 x 10 Photo
8. Copyboard
8. Lights
9. Camera
10. Film; Gray Scale
11. Squeegee
12. Opaque Paper
13. Masking Tape
14. Flashing Lamp
15. Tissue Diffusion Sheets
16. Magnifier
17. Light Table

INFORMATIONAL ASSIGNMENT: (Student)

Kagy, Frederick D. and J. Michael Adams. Graphic Arts Photography. North Scituate, MA: Breton Publishers, 1983, ch. 8.

REFERENCES:

Cogoli, John E. et al. Graphic Arts Photography. Pittsburgh, PA: Graphic Arts Technical Foundation, 1981, ch. 10.

INTRODUCTION:

Learning how to calculate the exposures for individual combinations of screen, camera and film is important if quality is to be achieved. Without an understanding of this procedure, halftone production is a hit-or-miss process that would be extremely expensive.

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

STEPS OF PROCEDURE:

1. Study HO 1 and learn to recognize halftone dot percentages.

2. Select a gray halftone contact screen large enough to cover most film sizes used. (See contact screen information in Unit V, lesson 2.)

3. Make test to determine basic screen density range and basic flash time as follows:

   a. Place 8 x 10 photo on copyboard with calibrated gray scale on top of it. The photo is used to simulate the flare conditions in shooting halftones.

   b. Set lights, camera as done in line test. (See Unit V, lesson 5)

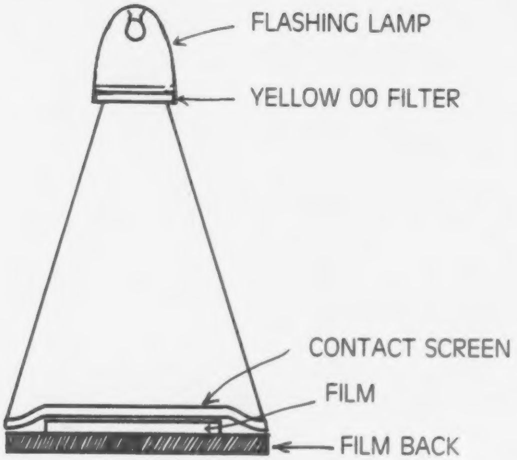
   c. Reproduction size may be reduced to 75% if it will fit the film better.

   d. Place sheet of film on vacuum back. It must be large enough to pick up gray scale and it must have a one or two inch strip of blank area.

   e. Cover film with gray contact screen. Use squeegee roller, if necessary, to get good contact. Remember: light side of film goes towards lens. Emulsion side of screen makes contact with emulsion side of film.

   f. Cover all but a one inch strip of film with opaque paper. It may be necessary to use masking tape to make this paper stay in position on screen. Use small pieces of tape at the edge of the film back to mark the edge of this strip.

   g. Using another opaque paper cover, make a step-off at three second intervals of the flashing lamp. (The flashing lamp is made up of a bee-hive safelamp housing with a 00 filter and a 7 1/2-watt bulb. It should be positioned four feet from film back and at right angles to it. If flash exposure times prove too short, one or two tissue diffusion sheets may be added to the filter to lengthen the exposure times.)



h. Add an overall six to ten second exposure to the step-off.

i. Cover flash step-off exposure area and remove cover over remainder of film.

j. Close vacuum back and make a main test exposure, exposing the film to the gray scale in the copyboard. Try a test exposure of three times standard line exposure. The exposure must be of sufficient length to make at least one or two steps of gray scale solid when the film is processed.

k. Remove the mask and screen from the film. Screen should be handled carefully by its corners and kept in a clean, dust-free folder.

l. Process film, controlling all variables. (See Unit VI, lesson 1)

m. Examine the flash step-off negative on the light table and, using a magnifier, look for the smallest printable dot. (5% to 10%) This step, with this small, dense, even-patterned dot, will be the basic flash time. Record this time on worksheet. (HO 2)

n. Examine the main exposure test negative of the gray scale. Place it on a viewer or light table and look at the gray scale steps through a magnifier. At the least, step one of the gray scale, which is the lightest, should be solid black on the negative. Examine each successive step of the gray scale until you identify the step with small, clear, open dots (approximately 10% negative dots). Record the density of this step on worksheet HO 2 in the blank labeled "10% Highlight Density."

o. Continue your examination of the scale until you can identify the step that is open and clear except for small black dots (approximately 90% negative dots). Record the density of this step on worksheet HO 2 in the blank labeled "90% Shadow Density."

p. Subtract the screen highlight density from the screen shadow density to determine the screen basic density range (BDR).

4. The basic density range (BDR) determined from this test is valid for this screen used in the same conditions; i.e. same film, camera, processing techniques, etc.

5. The basic density range (BDR) is the range of densities of continuous-tone copy that may be reproduced without using supplementary exposures. The densities at which the 10% and 90% dots are located can be changed by altering the main exposure, however, the BDR will remain the same. It will shift to lower actual densities with reduction of exposures and shift to higher densities with increased exposures.

6. This knowledge may be applied to shooting halftones of continuous-tone copy. Through calculations, these dot percentages may be located in any densities desired in the original.

7. The flash exposure may be used to compensate for density ranges of copy that exceed the screen basic density range (BDR). The difference between the screen range (BDR) and the density range of the copy (CDR) is called "excess density range" or more simply "excess density." The flash exposure adds dots to the shadow end of the scale and, in effect, lengthens the range of densities that can be reproduced by the screen.

(Note: Unit V, lesson 6 Assignment Sheet utilizes the data obtained in this lesson to determine the exposure times for shooting a halftone.)

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

INTERACTION ITEMS:

1. How does the main exposure affect the BDR (basic density range) of the screen?

2. True/False:

   a. The BDR determined by testing is valid for all gray screens as long as they are used with our film and camera.

   b. The flash exposure adds dots to the highlight areas of the halftone.

   c. The density difference between the 10% step and the 90% step on the negative of the gray scale is called the BDR or basic density range of the screen.

   d. The step on the flash test that produced the smallest printable dot is the basic flash time.

3. Why do we make the flash test and basic exposure test on the same piece of film?

4. Why, on the main test exposure, is it necessary to expose long enough to close up step 1 of the gray scale?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

EVALUATION ITEMS:

NAME OF STUDENT: ________________

DETERMINING BASIC HALFTONE EXPOSURE TIMES

EQUIPMENT:

1. Gray Halftone Contact Screen
2. 8 x 10 photo
3. Copyboard
4. Lights
5. Camera
6. Film; Gray Scale
7. Squeegee
8. Opaque Paper
9. Masking Tape
10. Flashing Lamp
11. Tissue Diffusion Sheets
12. Magnifier
13. Light Table
14. HO 1; HO 2

DID THE STUDENT:	YES	NO
1. Study HO 1 and learn to recognize halftone dot percentages.		
2. Select a gray halftone contact screen large enough to cover most film sizes to be used.		
3. Make test to determine basic screen density range and basic flash time as follows: a. Place 8 x 10 photo on copyboard with calibrated gray scale on top of it. The photo is used to simulate the flare conditions in shooting halftones.		
b. Set lights, camera as done in line test.		
c. Reproduction size may be reduced to 75% if it will fit the film better.		
d. Place sheet of film on vacuum back. It must be large enough to pick up gray scale and it must have a one or two inch strip of blank area.		

DID THE STUDENT:	YES	NO
e. Cover film with gray contact screen. Use squeegee roller, if necessary, to get good contact. Remember: light side of film goes towards lens. Emulsion side of screen makes contact with emulsion side of film.		
f. Cover all but a one inch strip of film with opaque paper. It may be necessary to use masking tape to make this paper stay in position on screen. Use small pieces of tape at the edge of the film back to mark the edge of this strip.		
g. Using another opaque paper cover, make a step-off at three second intervals of the flashing lamp. (The flashing lamp is made up of a bee-hive safelamp housing with a 00 filter and a 7 1/2-watt bulb. It should be positioned four feet from film back and at right angles to it. If flash exposure times prove too short, one or two tissue diffusion sheets may be added to the filter to lengthen the exposure times.)		
h. Add an overall six to ten second exposure to the step-off.		
i. Cover flash step-off exposure area and remove cover over remainder of film.		
j. Close vacuum back and make a main test exposure, exposing the film to the gray scale in the copyboard. Try a test exposure of three times standard line exposure. The exposure must be of sufficient length to make at least one or two steps of gray scale solid when the film is processed.		
k. Remove the mask and screen from the film. Screen should be handled carefully by its corners and kept in a clean, dust-free folder.		
l. Process film controlling all variables.		
m. Examine the flash step-off negative on the light table and look, using a magnifier for the smallest printable dot. (5% to 10%) This step, with this small, dense, even patterned dot will be the basic flash time. Record this time on worksheet. (HO 2)		

DID THE STUDENT:	YES	NO
n. Examine the main exposure test negative of the gray scale. Place it on a viewer or light table and look at the gray scale steps through a magnifier. At the least, step one of the gray scale, which is the lightest, should be solid black on the negative. Examine each successive step of the gray scale until you identify the step with small, clear, open dots (approximately 10% negative dots). Record the density of this step on worksheet HO 2 in the blank labeled "10% Highlight Density."		
o. Continue your examination of the scale until you can identify the step that is open and clear except for small black dots (approximately 90% negative dots). Record the density of this step on worksheet HO 2 in the blank labeled "90% Shadow Density."		
p. Subtract the screen highlight density from the screen shadow density to determine the screen basic density range (BDR).		
4. The basic density range (BDR) determined from this test is valid for this screen used in the same conditions; i.e. same film, camera, processing techniques, etc.		
5. The basic density range (BDR) is the range of densities of continuous-tone copy that may be reproduced without using supplementary exposures. The densities at which the 10% and 90% dots are located can be changed by altering the main exposure; however, the BDR will remain the same. It will shift to lower actual densities with reduction of exposures and shift to higher densities with increased exposures.		
6. This knowledge may be applied to shooting halftones of continuous-tone copy. Through calculations, these dot percentages may be located in any densities desired in the original.		

DID THE STUDENT:	YES	NO
7. The flash exposure may be used to compensate for density ranges of copy that exceed the screen basic density range (BDR). The difference between the screen range (BDR) and the density range of the copy (CDR) is called "excess density range" or more simply "excess density." The flash exposure adds dots to the shadow end of the scale and, in effect, lengthens the range of densities that can be reproduced by the screen.		

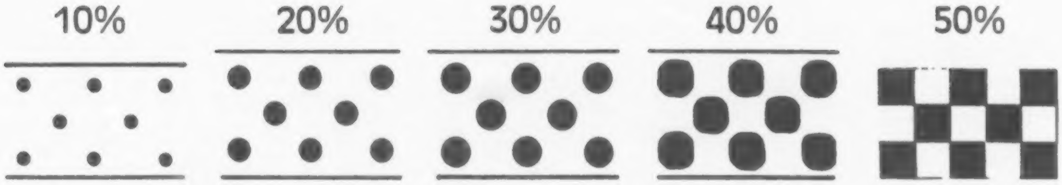
The student has satisfactorily completed the procedure "DETERMINING BASIC HALFTONE EXPOSURE TIMES" according to the steps outlined.

Instructor's Signature
(Verifying Satisfactory Completion)

Date

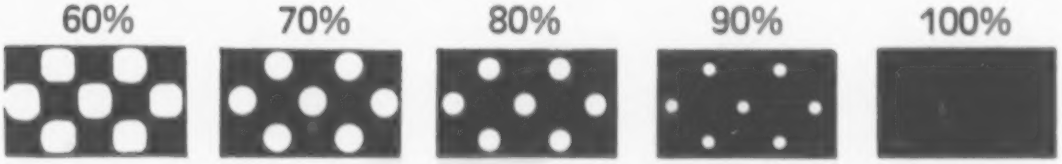
HO 1

Halftone Dot Evaluation Chart



Halftone dot formation starts when a small amount of light penetrates the lightest areas of the screen, thus producing small black dots.

As the intensity of the light increases, more light penetrates the screen and forms larger and larger dots.



Dot growth continues with increasing exposure until the large black dots merge and leave only small clear areas.

HO 2

Screen Test Worksheet

Flash Test: Record the time that produced the step which contains the "smallest printable dot."

Basic Flash Time equals: ______ seconds

Basic Density Range Test: Record the times and densities called for below.

Basic Test Exposure Time equals: ______ seconds

(90%) Shadow Density equals ____________
— (10%) Highlight Density equals ____________

Basic Density Range of Screen equals ____________ equalsBDR

Example:
Basic Flash Time 21 seconds
Basic Main Exposure Time 60 seconds

(Produces 90% dot) Shadow Density equals 1.25
(Produces 10% dot) Highlight Density equals − .35

Basic Density Range of Screen (or BDR) equals .90

HO 3

Halftone Worksheet

Basic Test Data

Basic Flash Time equals ______ seconds
Main Test Exposure Time equals ______ seconds

Test Shadow Density (90%) equals: ______
Test Highlight Density (10%) equals: ______

Basic Density Range (BDR) ______

This data from halftone test-copy from HO 2.

Copy Data

Copy Shadow Density equals ______
— Copy Highlight Density equals ______

Copy Density Range (CDR) equals ______

CDR equals ______
— BDR equals ______

Excess Density equals ______

New Main Exposure Time: ______ seconds
Flash Exposure Time: ______ seconds

ASSIGNMENT SHEET 1 - SHOOTING HALFTONES

Introduction:

Companies such as Eastman Kodak and DuPont have developed aids for shooting halftones. Each of these tools is available from its respective company and it comes with complete instructions.

Kodak Graphic Arts Exposure Computer and Calibration Gray Scale (Q-12)
Kodak Halftone Negative Calculator (Q-15)
Kodak Data Center for Quality Camera Work (Q-700)
DuPont Shadow Flash Computer

Other tools are available which may be attached to the camera. These electronic instruments will integrate the exposures and calculate them based on copy densities entered into the memory.

SHOOTING A HALFTONE - PROCEDURE A:

In this example, we will use the Kodak Halftone Negative Calculator (Q-15).

1. Select a good black and white photograph.
2. Measure the highlight and shadow densities and record them on the halftone worksheet (HO 3). (See Unit V, lesson 4)
3. Subtract the highlight density from the shadow density to obtain the copy density range (CDR).
4. Subtract the basic density range (from HO 2) from the copy density range to obtain the excess density.
5. Remove any tape from previous uses from the Q-15 calculator and calibrate the calculator by setting dials with the basic test data. (Assume we will use the example from HO 2.)

Example:
Basic Flash Time 21 seconds
Basic Main Exposure Time 60 seconds

(Produces 90% dot) Shadow Density equals 1.25
(Produces 10% dot) Highlight Density equals — .35

Basic Density Range of Screen (or BDR) equals .90

a. Position the M dial at the highlight density .35.
b. Move the mask wheel to the shadow density of 1.25.
c. Move the main exposure tab so that the main exposure shows in the main exposure window (60 seconds)
d. Rotate the clear plastic dial so it reads basic flash 21 seconds and the quadrant zero arrow aligns with the 0 on the flash scale.
e. Tape the dials and arm in place.

6. To determine the main and flash exposures for new copy use the following steps
   a. Measure copy highlight and shadow densities. Determine the difference for copy density range (CDR).
   b. Determine excess density by subtracting the BDR from the CDR.
   c. Example:

Copy Shadow Density equals 1.55
Copy Highlight Density equals .13
Copy Density Range equals 1.42 CDR

BDR equals .90

CDR minus BDR equals Excess Density
1.42 minus .90 equals .52 Excess Density

   d. Move pointer M of the calculator to the highlight density of the copy. In our example it is .13. Read the new main exposure in the open window. In our example it is 33 seconds.
   e. Move the F hairline into position at the shadow density of the copyphoto. In our example it is 1.55. Read the flash exposure time on the transparent scale. It is 14½ seconds.

SHOOTING A HALFTONE - PROCEDURE B

In this example we will use the Kodak Q-12 Exposure Computer. Note that the exposure times obtained with this tool will not exactly match those determined by the Q-15 calculator. (The Q-15 compensates for middletone shift caused by flashing.)

1. Select photo and determine highlight and shadow densities. Record on HO 3 worksheet. (See Unit V, lesson 4)
2. Subtract highlight density from shadow density to obtain copy density range (CDR).
3. Subtract basic density range (from HO 2) from the copy density range to obtain excess density.
4. Calibrate the exposure computer Q-12 by setting the dials with the basic test data. (Use the example from HO 2.)

Example
Basic Flash Time 21 seconds
Basic Main Exposure Time 60 seconds

(Produces 90% dot) Shadow Density equals 1.25
(Produces 10% dot) Highlight Density equals — .35

Basic Density Range of Screen (or BDR) equals .90

a. Rotate computer dials positioning 100% (75% if that was used for test reproduction size) opposite the *f-22* lens aperture.

b. Holding the bottom dial with one hand so it will not turn, rotate the red density dial until .35 (from example) highlight density is opposite the 60 second test main exposure (from example).

c. Tape these two dials together to the computer base with a short piece of masking tape. Exposure computer is now ready to determine new exposure times.

5. To determine the main and flash exposures for new copy use the following steps:

a. Determine densities and density range of new copy.
Example:

Copy Shadow Density equals	1.55
− Copy Highlight Density equals	.13
Copy Density Range equals	1.42 CDR

BDR equals .90

CDR minus BDR equals Excess Density

1.42 minus .90 equals .52 Excess Density

b. Locate the copy highlight density (.13 from example) on the red density dial on the calculator. Aligned opposite of this density on the exposure time wheel is the new main exposure time, 36 seconds.

c. Locate, on the flash table, the basic flash exposure time determined in the test. In our example it is 21 seconds. This basic flash time is shown down the left side of the chart.

d. Look horizontally across to the number below the excess density (.52 in our example) and determine the new shadow flash time (approximately 14 seconds). Enter these new exposure times on your worksheet HO 3.

NOTE: It is sometimes necessary to interpolate between times. In our example, the basic flash time of 21 seconds is not on the table, nor is an excess density of .52.

ANSWERS TO ASSIGNMENT SHEET 1 - SHOOTING HALFTONES

The instructor will evaluate each assignment on an individual basis using the criteria set in this unit.

LESSON PLAN: 7

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

SCOPE OF UNIT:

When photosensitive materials are exposed to image-making light, an invisible image called a latent image is produced. This image is produced whether the exposure is done by camera, by contacting, by scanner or by accident. Unit V explores camera exposures and the variables inherent in the process. Unit V must be taught in conjunction with Unit VI, Processing Photographic Material. Many commonalities exist between Exposing With A Camera and Contacting, Unit VII.

INFORMATION TOPIC: V-7 OR DEMONSTRATION:

SPECIAL EFFECTS PHOTOGRAPHY
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Define special effects photography.
2. Name criteria for selecting copy for posterization.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. AS 1: Shooting A Three Tone Posterization

It is suggested that the instructor collect a variety of special effect illustrations from magazines and display them on the bulletin board or show them to class using an opaque projector. Have the students discuss how they were produced.

INFORMATIONAL ASSIGNMENT: (Student)

Kagy, Frederick D. and J. Michael Adams. Graphic Arts Photography. North Scituate, MA: Breton Publishers, 1983, chs. 10, 11.

REFERENCES:

INTRODUCTION:

Dull, ordinary copy can often be made exciting and attractive by using one or more camera techniques called "special effects." These techniques allow the camera operator to be creative, limited only by his/her imagination. Some ideas and examples are provided in this lesson.

LESSON PLAN: 7

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

OUTLINE: (Key Points)

I. Special Effects Defined

Special effects photography is used by many graphic designers to add something different to their design. This broad area of photographic modification may be done by the professional photographer, the artist, or by the graphic arts photographer in the process darkroom. Other techniques may require additional work by the image assembly craftsman (stripper). Special effects or image modification should be reserved for special occasions so not to become routine.

II. Types of Special Effects

A. Line conversions - converting continuous-tone to line copy

1. Silhouettes - line shots of continuous-tone copy; may be printed positive or negative

2. Tone line - continuous-tone positive and negative sandwiched base to base; contact print produces lines at subject outlines. Additional handwork is usually required.

3. Base Relief - similar to tone line but positive and negative are positioned slightly out of register, emulsion to emulsion. Resulting contact photo will be continuous-tone and must be shot as a halftone to be reproduced.

B. Posterization - provides an endless possibility of creative effects. Posterization photographically reduces the many tones of a continuous-tone photo to a few select areas. Provides an abstract photographic drawing of the original.

1. Single color - posterization can be printed in one color by simply using screen tints in two of the areas. A three tone posterization will be produced by three line shots of a continuous-tone copy. Each successive line shot will be allowed to carry more of the detail. This can be done by making three shots as in this example:

a. Overexposed - overdeveloped to step 7 on gray scale; this negative will print solid.

b. Normal exposure - slightly overdeveloped to step 5 on gray scale; this negative will be printed in register with negative (a) and will be printed in a 40% tint.

c. Underexposure - underdeveloped to step 2-1/2 or 3 on the gray scale; this negative will print in 10% or 20% tint.

All posterizations must, of course, be printed in register. One color posterizations, as shown above, must be pin registered and exposed to the plate several times. (See Unit VIII for this technique.)

2. Multiple color posterizations can be made much the same as above except that each printer prints in a different color, in register. For example, negative "a" from above might print in black; negative "b" in red; and negative "c" in yellow.

3. Posterizations are seldom made in more than four colors or more than four tones. Posterizations made in a number of tones of black might look like a poor quality halftone. Screens must be angled between each tone of black; 30° is the normal angle. Exceeding four screen angles produces an undesirable moiré pattern.

4. Posterizations can be used in combination with other special effects and normal halftone techniques to produce variety in the results. Artistic hand work may be added to create new effects.

C. Duotones, in a broad sense, are simply two halftones shot of the same continuous-tone subject, printed in two colors.

1. Both halftones must be shot at the same percent of reproduction.

2. Screens must be angled at 30° to each other.

3. Most duotones use different emphasis in each shot. For example, a winter scene shot as a duotone might carry the highlight details in the blue printer; this allows the shadow areas to be solid blue. The black printer might carry no detail in the highlights but provide the shadow area with

the details. This type of treatment would produce a printed piece with cold, blue snow and sky and deep blue-black shadow areas.

4. Duotones, like posterizations, require careful selection of subject copy; they also require careful planning to produce the desired effects.

D. Duotint, sometimes called fake duotone, is simply a black halftone printed over a color screen tint. It can be an effective and inexpensive way to add color to illustrations.

E. Many screen tints and pattern tints are available and can be used effectively in a variety of ways.

   1. Fake shadows and backgrounds.

   2. Block tints can reduce a solid to a shade (color or black).

   3. Patterns can be used to fill type or line areas.

   4. Tints are available on film for use in the camera or stripping area. They are also available on paper as dry transfer tints; these allow the paste-up artist to work with them.

F. Other effects (See Unit VII for surprints, reverses, etc.)

   1. Non standard process color - using process separations but printing them in other colors

   2. Double exposure - done with copy shift or accomplished by professional photographer

   3. Solarization - a continuous-tone darkroom printing technique using an extra white light exposure

   4. Air brush retouching and hand-done special effects

III. Summary and Conclusion

   A. Special effects defined

   B. Types of special effects

LESSON PLAN: 7

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

INTERACTION ITEMS:

1. Why do we angle the halftone screen for the second shot of a duotone?
2. What kind of copy is best suited to duotones?
3. Why might a designer want to use special effects photography?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 7

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

EVALUATION ITEMS:

1. A doubling of exposure will increase the resulting density by ___________ density.
2. What is special effects photography?
3. Why use special effects?
4. List three criteria for good posterization copy.

LESSON PLAN: 7

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

ANSWERS TO EVALUATION ITEMS:

1. .30
2. Special effects photography is photographic modification of copy (usually continuous-tone). It is used to enhance copy or create some artistic effect.
3. It is a way that dull, ordinary photos can be turned into interesting illustrations. Some special effects allow you to add color to black and white copy.
4.
   a. Relatively high contrast
   b. Large shadow, highlight and mid-tone areas rather than busy detail
   c. All areas of the density range represented by subject matter

ASSIGNMENT SHEET 1 - SHOOTING A THREE TONE POSTERIZATION

1. Select a continuous-tone photo of relative high contrast; it should contain large areas of image and shadow rather than a lot of detail. Photo should be well-represented in all areas of the density range, including mid-tones.

2. Using the densitometer, read three densities:
   a. Highlight area - not pure white but in the light area
   b. Mid-tone area - the grays you wish to represent by the middle tone of the posterization
   c. Shadow area - dark grays and black

3. Using your normal line exposure as a standard, you can assume that it will produce a density of .35 (4th step on gray scale).

4. You may shift the step in the gray scale by increasing and decreasing your exposure.

   Example: Assume normal line exposure equals 20 seconds.

20 seconds produces solid step 4 (.35)

*Assume we wish to produce solid steps 3, 5, and 7 for our three posterization printers.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
.05	.13	.20	.35	.50	.65	.80	.95	1.10	1.25	1.40	1.55	1.70	1.85	2.00	2.10
		*		*		*									

Rule: Doubling the exposure time will shift the density .30 up the scale. Halving the exposure time will shift the density .30 down the scale.

5. To achieve a solid step 7, we need to increase the exposure two and one-half times or 60 seconds.

   20 seconds produces .35 (4th)
   Step 7 equals .80 .80 minus .35 equals .45 density

6. To achieve a solid step 5, we need to increase our exposure by one and one-half times or 30 seconds.

   20 seconds produces .35 (4th)
   Step 5 equals .50 .50 minus .35 equals .15 density

7. To achieve a solid step 3, we need to decrease our exposure by one-half or 10 seconds.

   20 seconds produces .35 (4th)
   Step 3 equals .20 .35 minus .20 equals .15 density

8. Shoot the copy at the above times and process to the indicated steps on the gray scale.

9. In the light printer (step 3), lay a 10% tint.

10. In the mid-tone printer (step 5), lay a 40% tint.

11. Expose each of these in turn to a piece of print paper. Remember to angle the screens and to expose in register by pin register or by flapping the negatives.

12. If the instructor prefers, the three printers may be proofed on Color Key (or other color proofing material) to provide a three color posterization.

ANSWERS TO ASSIGNMENT SHEET 1 - SHOOTING A THREE TONE POSTERIZATION

The instructor should evaluate each assignment on an individual basis according to the steps outlined in this unit.

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

SCOPE OF UNIT:

When photosensitive materials are exposed to image-making light, an invisible image called a latent image is produced. This image is produced whether the exposure is done by camera, by contacting, by scanner or by accident. Unit V explores camera exposures and the variables inherent in the process. Unit V must be taught in conjunction with Unit VI, Processing Photographic Material. Many commonalities exist between Exposing With A Camera and Contacting, Unit VII.

INFORMATION TOPIC: V-8 OR DEMONSTRATION:

BASIC COLOR
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Explain additive color theory.
2. Explain subtractive color theory.
3. Identify the three process colors.
4. Describe photomechanical separation using filters.
5. Describe, in general terms, separation by scanning.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. TM 1: Visible Spectrum
2. TM 2: Additive Color-Projected Light of Primary Colors
3. TM 3: Color Wheel
4. TM 4: Subtractive Color
5. TM 5: Color Scanner

INFORMATIONAL ASSIGNMENT: (Student)

Kagy, Frederick D. and J. Michael Adams. Graphic Arts Photography. North Scituate, MA: Breton Publishers, 1983, ch. 12, 13.

REFERENCES: (Instructor's Additional Information)

INTRODUCTION:

This lesson will introduce the student to color theory, color separation of full color copy, and explore methods used in color separation. It is important for the student to understand that separating full color into its three component printing colors is rather simple in theory; but is an involved, complex and often expensive process in the real world of commercial printing. This lesson, therefore, is concerned with how it happens, not how to do it.

The world we live in is a world of color, and color makes two-dimensional printing products appear real. Color has meaning to many! Colors toward the reds are warm feeling and those toward the blues are cool. Black is for mourning, pink is feminine, etc. Advertisers are well aware of the feeling and moods supported by color and are demanding more and more color in their printing. Although color printing is more expensive than black and white, the effectiveness it provides in influencing the reader to act has proven to be worth the cost.

Because color sells and because competitive media such as TV exploit color, the technology discussed in this unit has evolved. Some of the technology, such as electronic separation and correction, is relatively new; while other color separation techniques are simply refinements of traditional photomechanical processes.

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

OUTLINE: (Key Points)

I. Color Separation - Definitions

A. Color separation is the process of photographically and/or electronically separating a color original into three black and white film records of the three primary subtractive colors of cyan, magenta and yellow. Black is added for detail and show definitions, hence it is a four-color process.

B. Four-color printing or color reproduction of originals refers to printing these four colors (cyan, magenta, yellow and black) one at a time with a printing press to provide a reasonable facsimile of the color original.

II. Color Principles

A. Visible spectrum - white light passing through a prism provides us with a visible spectrum as each wavelength is refracted at a different angle. (TM 1) The colors produced in the visible spectrum are called the primary additive colors of violet, blue, blue-green, yellow, and red.

INSTRUCTOR NOTE: See Classroom, Laboratory, or Other Activities section for tips on using this Transparency Master.

1. All of these colors are made of red, blue, and green.
2. Television uses these three colors in an additive process to permit the human eye to mix these and produce all colors.
3. Primary red, green and blue lights shining on a white surface will produce white light where they cross or overlap. (TM 2)

INSTRUCTOR NOTE: See Classroom, Laboratory, or Other Activities section for tips on using this Transparency Master.

a. Where the red and green overlap, yellow light is produced.

b. Where the blue and green overlap, cyan is produced.

c. Where the red and blue overlap, magenta is produced.

4. Color wheel (TM 3)

INSTRUCTOR NOTE: See Classroom, Laboratory, or Other Activities section for tips on using this Transparency Master.

a. Used by artists and printer as tool to:

b. Identify basic color relationships

c. Color wheel shows three primary *additive* colors of red, blue, green and their three complementary colors of yellow, magenta and cyan.

d. Color wheel shows three primary *subtractive* colors of yellow, magenta and cyan and their three complementary colors of red, blue and green.

B. *Additive Color Theory* is the basis for working with all color. It involves the mixing of primary light colors of red, blue and green. Primary colors are those which cannot be produced by mixing two or more other colors.

C. *Subtractive Color Theory* is the way in which color printing provides color to the eye using subtractive primary colors of yellow, cyan and magenta.

1. Paper on which printing is done is *white* and is made up of all colors of the visible spectrum.

2. Colored *transparent inks* printed on the white paper filters certain colors out of the white to produce the perceived or apparent color. Paper which is not white reflects some colors in white light in different amounts and is deficient in certain colors. These deficient colors will not be available to our eye to view. (TM 4)

INSTRUCTOR NOTE: See Classroom, Laboratory, or Other Activities section for tips on using this Transparency Master.

3. The following are examples of the subtractive theory working. It must be assumed that printing is done on white paper, which reflects all the colors of the visible spectrum equally.

a. Magenta ink printed on white paper filters out or "subtracts" the green, thereby leaving the primary colors of blue and red visible. (Blue and red light combine to make magenta.)

b. Yellow ink printed on white paper filters out or "subtracts" the blue, thereby leaving the primary colors of red and green visible. (Red and green light combine to make yellow.)

c. Cyan ink printed on white paper filters out or "subtracts" the red, thereby leaving the primary colors of blue and green visible. (Blue and green light combine to make cyan.)

d. Magenta and yellow printed on white paper produce red. Magenta subtracts the reflected green light and yellow subtracts the reflected blue light thereby leaving only the red reflected light visible.

e. Magenta and cyan printed on white paper produce blue. Magenta subtracts the reflected green light and cyan subtracts the reflected red light thereby leaving only the blue reflected light visible.

f. Cyan and yellow printed on white paper produce green. Cyan subtracts the reflected red light and yellow subtracts the reflected blue light thereby leaving only the green reflected light visible.

g. Magenta, cyan and yellow all printed on white paper will produce black. Magenta subtracts the green, cyan subtracts the red, and yellow subtracts the blue reflected lights thereby eliminating any light reflected from the white paper. This absence of light is known as black. NOTE: In actual practice, the resulting color takes on a tint of the last color printed on top. For this reason, black ink is most often printed as part of process printing to give the blacks a "real black" look.

h. Various amounts of these colors can be printed by screening the primary subtractive colors as halftones or screen tints. Virtually any shade of any color can thus be reproduced.

III. Separating the Colors

- A. Types of color copy
  - 1. Transparent copy
    - a. Positive or negative
    - b. Original photos or photos of artwork or duplicates
    - c. 35mm to 8 x 10 sizes
    - d. Advantage - can project to view how finished print should look
    - e. Disadvantage - density range is longer than process can produce; must be very sharp to enlarge 35mm to desired size
    - f. Can produce duplicate to desired size or can make internegative and make print (reflective) to desired size.
  - 2. Reflective copy
    - a. Original photo or artist's original such as drawing, painting, airbrush, etc.
    - b. Disadvantage - may not fit on camera or color scanner; may cause color correction problems
    - c. Advantages - usually has reproducible density range
  - 3. Color negative copy - (transparent)
    - a. Color print negative film
    - b. Eliminates need to make print
    - c. Uses ordinary darkroom equipment
    - d. Produces separations quickly and inexpensively
    - e. Used primarily for newspapers
    - f. Quality is generally poor
    - g. Also known as ROP color

B. Standard methods for color separation

1. Photomechanical

a. Typically uses filters

(1) Red filter holds back the blue and green light (cyan) from the film, and exposes the red areas of the film. Clear areas of the negative will be the record of the cyan (blue and green) and will be the cyan printer.

(2) Green filter holds back the red and blue light (magenta) from the film and exposes the green areas of the film. Clear areas of the negative will be the record of the magenta (red and blue) and will be the magenta printer.

(3) Blue filter holds back the red and green light (yellow) from the film. Clear areas of the negative will be the record of the yellow (red and green) and will be the yellow printer.

(4) The black printer may be made with short exposures through all of the filters, one at a time, or a yellow filter may be used. The black printer is used to give depth to the shadows and will have very little or no detail in the mid-tones and highlights.

b. Halftones are made of each printer.

(1) Direct - halftones are screened at the time of exposure through the filters. Direct screen separation often lacks some control and sophistication in color correction. Direct screen color separation on an enlarger built specifically for that purpose, however, is capable of producing very high-quality, color corrected separations.

(2) Indirect - halftones are screened, usually in a camera, after the separations have been made on continuous tone film. This process permits color correction masking prior to screening.

c. Methods of photomechanical separation

- (1) By contact of transparency
    - (a) Make same size only
    - (b) Need new transparency to change size
    - (c) Difficult to make color correction
    - (d) Fast, inexpensive
    - (e) Light is filtered rather than image, therefore filter quality not as critical
- (2) Direct screen separation on camera
    - (a) May use reflective art
    - (b) Must work with filter factors
    - (c) Color correction difficult
- (3) Direct screen color separation on enlarger
    - (a) Enlarger programmable to proper exposure
    - (b) Color correction masks can be added to transparency
    - (c) Once it is set up, it is a fast process
- (4) Indirect color separation on camera
    - (a) Any size
    - (b) Time consuming and expensive
    - (c) Good color correction
    - (d) Control of halftone process
- (5) Separating from color negative
    - (a) Called ROP
    - (b) Poor quality

(c) Usually for newspaper editorial color

d. Color correction

(1) Masking of copy and/or continuous tone separations for screening.

(2) Dot etching

(a) Dots in negative and/or positives are made smaller with photographic reducer.

(b) Painted on by hand - requires skill and experience

(c) Allows for localized area of separations to be color corrected

(d) Expensive

2. Electronic Scanning

a. Major manufacturers of electronic color scanners

(1) Hell™

(2) Crosfield™

(3) Dianipon Screen™

(4) PDI™

(5) Linotype-Paul™

b. Expected to do virtually all color separation work by the 1990's.

c. Expensive machines

d. Produces electronically in much shorter time what was produced by camera.

e. Handles color correction electronically

f. Fundamentals of photomechanical color separation also apply to electronic scanning

g. Three possible outputs of color scanners

(1) Continuous tone separations, positives or negatives

        - (2) Screened separations using contact screens and exposure light tube or laser
        - (3) Screened separations with dots electronically generated by laser light
    - h. Most scanners work similarly to a lathe. Original copy is on revolving drum.
        - (1) Scanning lamp reads and electronically converts color densities into electronic impulses which drive an exposure output device such as exposure lamp or laser.
        - (2) Can enlarge and/or reduce by changing drum sizes.
    - i. Scanner operators/technicians are highly skilled, intelligent individuals and are in great demand. Background requires:
        - (1) Graphic arts courses - to learn about printing technology, the printing processes, and the printing industry
        - (2) Physics courses - to learn about color theory and optics
        - (3) Math courses to understand complexities of mixing color
        - (4) Electronics courses - to understand how computerized scanners work
        - (5) General education courses - to enhance communication skills, build citizenship qualities, preparation for promotion and increased responsibility

IV. Summary and Conclusions

- A. Color separation - definitions
- B. Color principles
- C. Separating the colors

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

INTERACTION ITEMS:

1. How has modern television affected the demand for color printing and the need to modernize the technology?
2. If making color separations is cheaper and faster by electronic methods than by camera, do you see similar changes occurring in black and white process photography?

CLASSROOM, LABORATORY, OR OTHER ACTIVITIES:

Instructor Tips for Using TMs:

1. TM 1 - Each band of light emitted from the prism may be shown in color by cutting strips of colored cellophane or color proofing material such as 3M Color Key™. Some transparency marking pens may be effective for this.
2. TM 2 - This display may be done in the classroom by using three projectors or small spotlights, each projecting light through a different primary color filter (red, blue, and green). Some color proofing material can be used for the filters. Experiment with the colors. Where all three primary color overlays overlap, the white projection screen should appear white.
3. TM 3 - Cut color proofing material to make transparent cells for color wheel. Use magenta and yellow to make red; yellow and cyan to make green; and cyan and magenta to make blue.
4. TM 4 - Using this master as a line copy for black overhead, cut magenta, yellow and cyan color proofing material to simulate the colored brush strokes. Each color may be on a separate overlay to show the various combinations of each color.

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

EVALUATION ITEMS:

1. Draw a circle and construct a color wheel using the additive color primaries.

2. Does this color wheel also show the process printing colors? What are they?

3. If we take all colors of light and merge them in equal amounts, what color will result?

4. If we print solid process colors one on top of another, what color will result?

5. Why is it important to print process color on white paper?

6. Describe exposing a negative of a color original through the blue filter.
   a. Which color(s) will be filtered out?
   b. Which color(s) will be transmitted to the film?
   c. Which color(s) will be printed on the plate made from this negative?

7. Operating an electronic color scanner requires a great deal of knowledge and skill. If you were to prepare yourself for a career in scanner operation, what classes should you take?

8. Why do we usually print black along with the three-process colors?

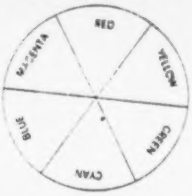
LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT V : EXPOSING WITH A CAMERA

ANSWERS TO EVALUATION ITEMS:

1.



The additive colors are red, blue and green

2. The process printing colors of magenta, yellow and cyan are shown on the color wheel because they are the complementary colors to the additive primaries. These three process colors would be considered the primary subtractive colors.

3. White light results if all colors of light are mixed in equal amounts.

4. Black will result if we print solid process colors one on top of another.

5. All colors are present in white paper, just as they are all present in white light.

6. The blue filter will hold back the red and green light (which mix to form yellow) from the film. Clear areas of the resulting negative will be the record of the yellow and will be the yellow printer.
   a. Red and green will be filtered out.
   b. Blue will be transmitted to the film and the exposed areas will represent blue of the original.
   c. Yellow will be printed from this negative. The unexposed areas will represent red and green. Yellow is the complementary color to blue.

7. a. Graphic arts courses - to learn about printing technology, the printing processes, and the printing industry

   b. Physics courses - to learn about color theory and optics

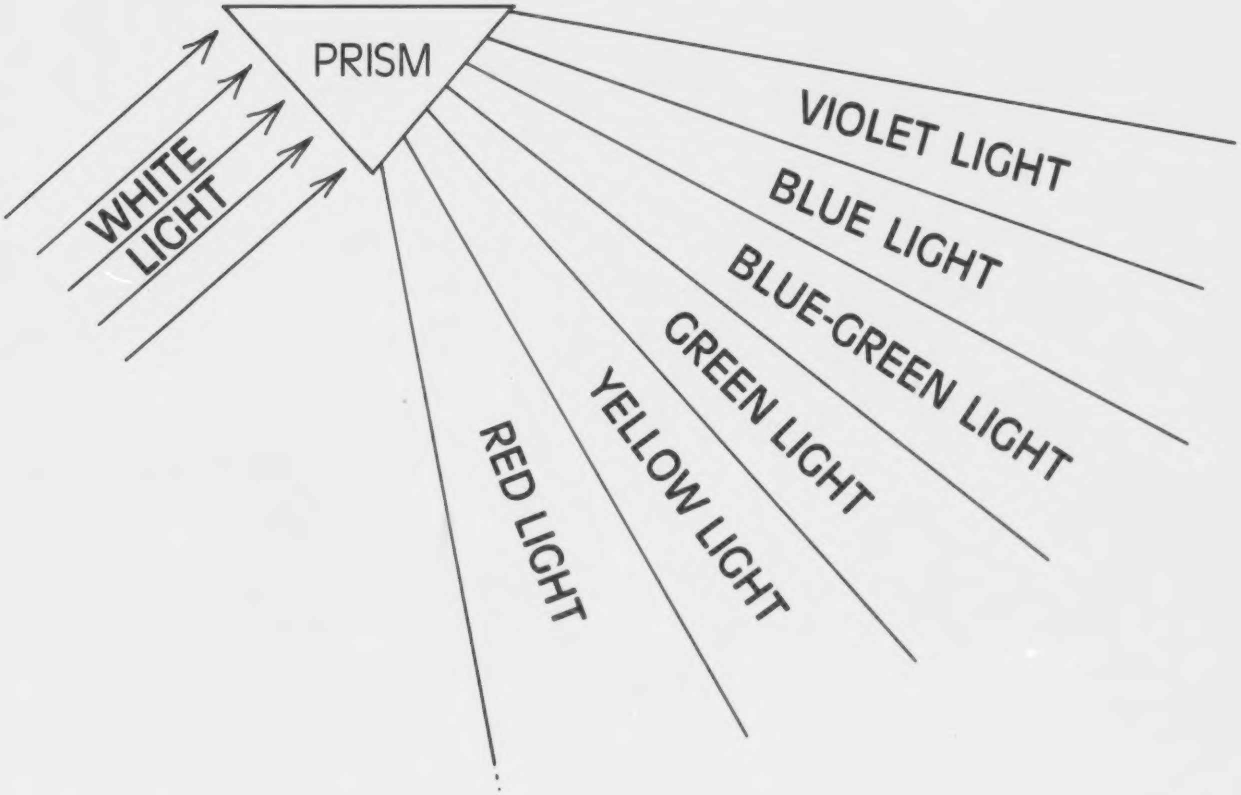
   c. Math courses to understand complexities of mixing color

   d. Electronics courses - to understand how computerized scanners work

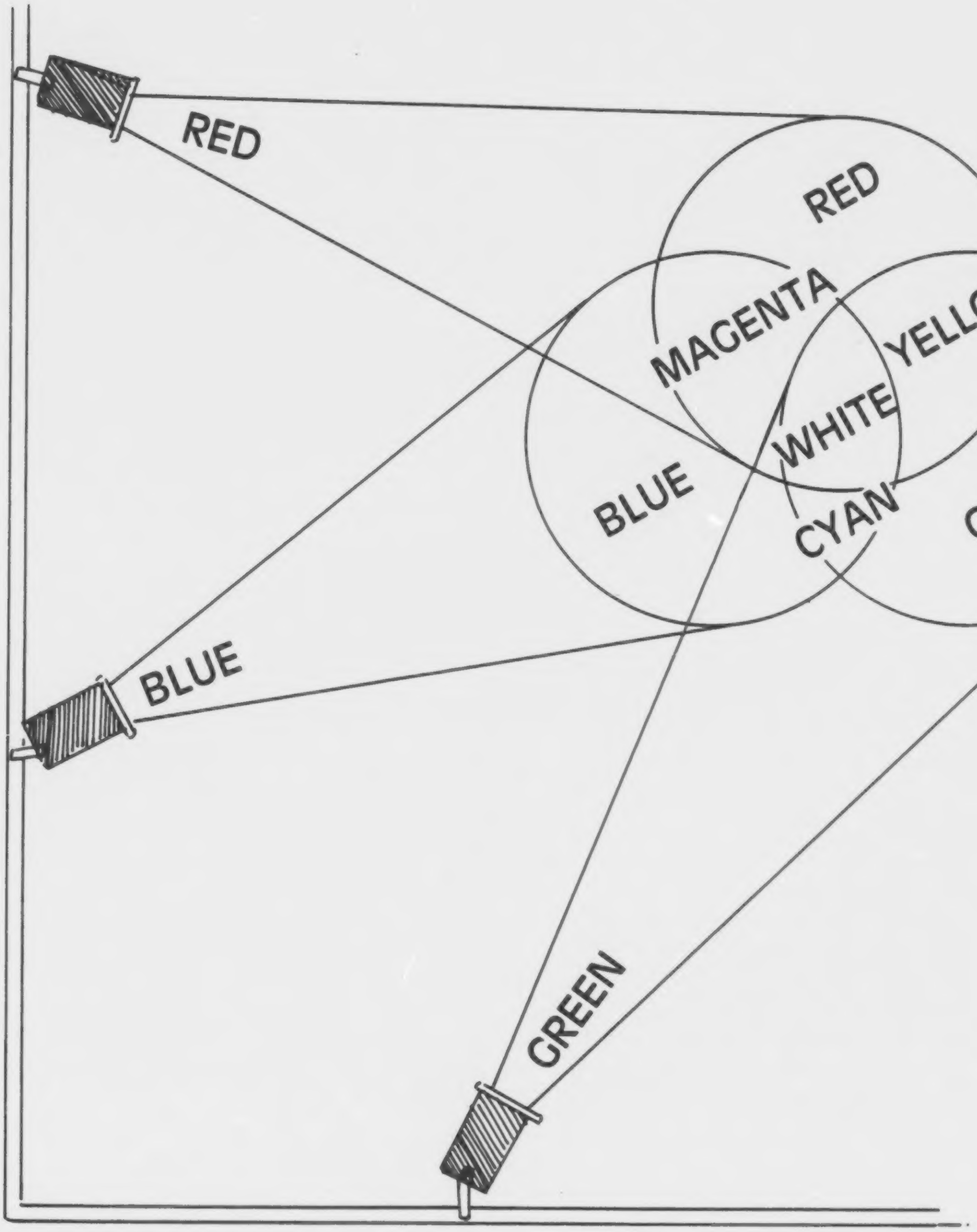
e. General education courses - to enhance communication skills, build citizenship qualities, preparation for promotion and increased responsibility

8. Black printed with the three process colors permits denser shadows and better detail. It has the ability to make an ordinary color image come alive and become almost three dimensional. Black covers the color tint left by the last color printed in the shadow areas.

Visible Spectrum


PRISM
WHITE LIGHT
VIOLET LIGHT
BLUE LIGHT
BLUE-GREEN LIGHT
GREEN LIGHT
YELLOW LIGHT
RED LIGHT

Projected Light of Primary Colors

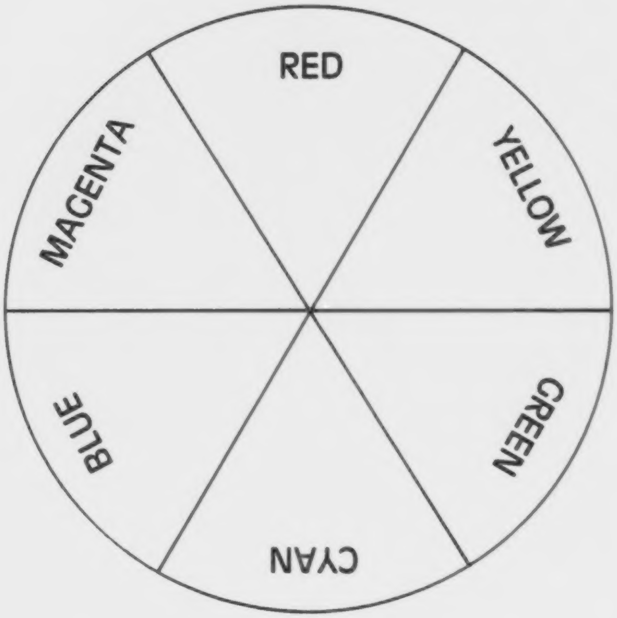

RED
RED
MAGENTA
YELLOW
WHITE
BLUE
CYAN
GREEN
BLUE
GREEN

TM 3

Color Wheel

ADDITIVE

3 Primary Additive Colors	3 Complementary Additive Colors
RED	YELLOW
BLUE	CYAN
GREEN	MAGENTA


RED
YELLOW
GREEN
CYAN
BLUE
MAGENTA

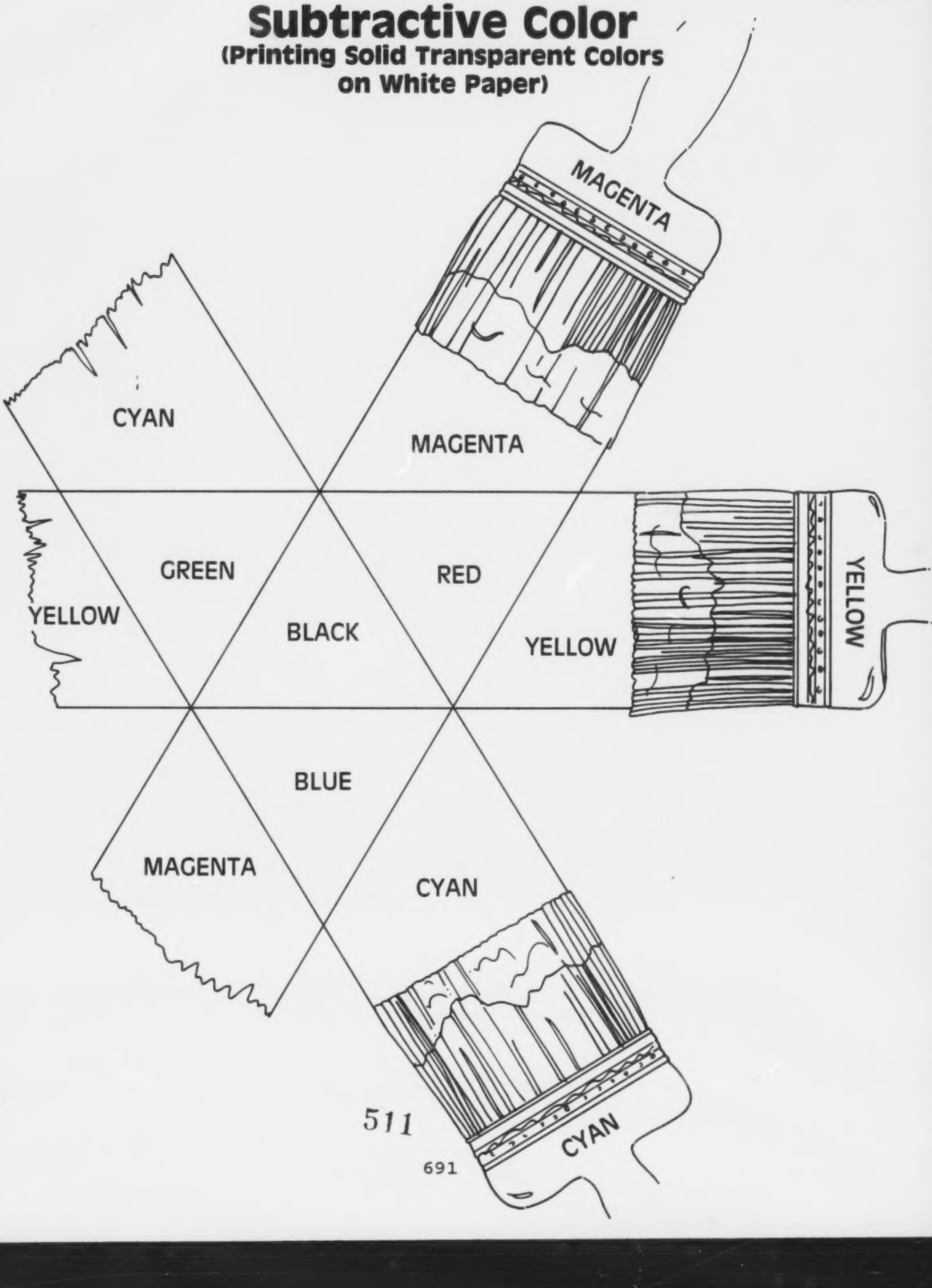
SUBTRACTIVE

3 Primary Subtractive Colors	3 Complementary Subtractive Colors
YELLOW	RED
CYAN	BLUE
MAGENTA	GREEN

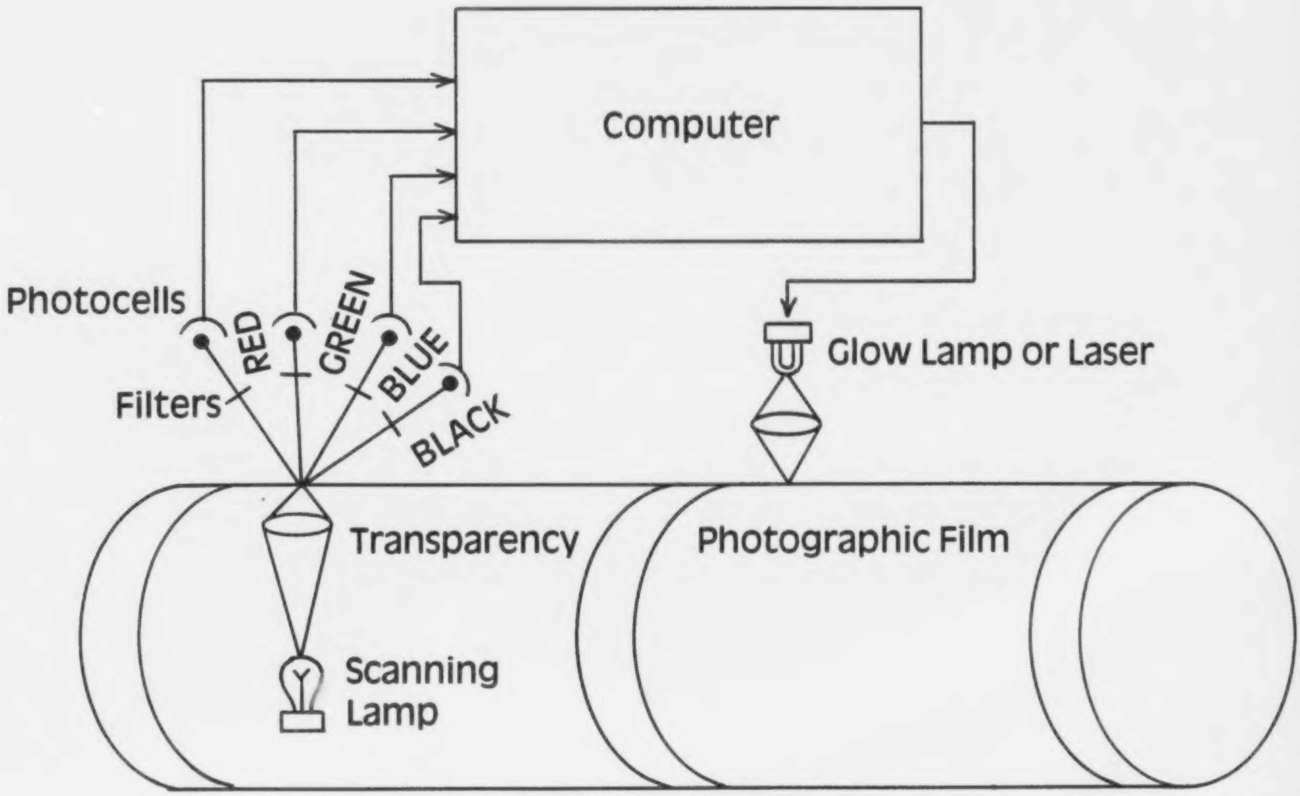
TM 4

Subtractive Color

(Printing Solid Transparent Colors on White Paper)


MAGENTA
CYAN
MAGENTA
GREEN
RED
YELLOW
YELLOW
BLACK
YELLOW
BLUE
MAGENTA
CYAN
CYAN

Color Scanner


Computer
Photocells
RED
GREEN
BLUE
BLACK
Filters
Glow Lamp or Laser
Transparency
Photographic Film
Scanning Lamp

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VI : PROCESSING PHOTOGRAPHIC MATERIAL

SCOPE OF UNIT:

When photosensitive materials are exposed to image making light, an invisible image is produced by the chemical change that has taken place. This invisible image, called a latent image, must be made visible through photographic processing. This unit explores the various methods used in processing photographic materials.

INFORMATION TOPIC: VI-1 OR DEMONSTRATION:

PROCESSING PHOTOGRAPHIC MATERIAL
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Name the four processing variables that must be controlled.
2. Define the purpose of each of the processing chemicals.
3. Describe stabilization processing.
4. Describe diffusion transfer processing.
5. List the advantages of automatic processing.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Preparing Chemicals for Lith Film Tray Processing
2. HO 2: Processing Lith Film
3. HO 3: Making a Diffusion Transfer Print
4. AS 1: Showing the Effects of Uncontrolled Variables on Processing
5. AS 2: Showing Adjacency Effect in Processing
6. AS 3: Showing the Effects of Inadequate Washing
7. AS 4: Processing a Line Negative
8. AS 5: Processing Halftones

INFORMATIONAL ASSIGNMENT: (Student)

Kagy, Frederick D. and J. Michael Adams. Graphic Arts Photography. North Scituate, MA: Breton Publishers, 1983, ch. 5.

REFERENCES:

Blair, Raymond N., ed. The Lithographer's Manual. 7th ed. Pittsburgh, PA: The Graphic Arts Technical Foundation, 1983, ch. 5.

INTRODUCTION:

A thorough knowledge of the commonalities of the various methods of photographic processing is necessary in order to gain the desired operational skills.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VI : PROCESSING PHOTOGRAPHIC MATERIAL

OUTLINE: (Key Points)

I. Manual Processing of Photographic Material

  A. Equipment

    1. Shallow tray

      a. Three trays - larger than sheet film

      b. Trays are rocked or agitated - little quantities of chemicals

      c. Most common of manual methods

    2. Deep tank

      a. Large tank

      b. Film is emersed and it is held by metal frame.

      c. Large quantities of chemicals - chemically replenished as needed

  B. Processing variables - four processing variables must be controlled. An assumption must be made that film quality (freshness) is maintained and that all exposure variables are under control.

    1. Strength of chemicals: The most accurate way to control strength (freshness) of processing chemicals (developer) is to always use new developer. Lith developer has a relatively short tray life and its strength is consumed in its use.

    2. Time of processing: A slight variance of processing time can, under certain conditions, cause a drastic effect on the results. A sweep second timer is a standard tool used to measure the time in the processing bath. Immediate emersion in fresh stop bath is critical to controlling processing time.

3. Temperature of processing chemicals: Most film manufacturers recommend 68°F (20°C) as a standard processing temperature. Developers, as they become warmer, become more chemically active and develop faster. Temperature-controlled water bath sinks have become widely used as a method of controlling this variable.

4. Agitation of the processing chemicals: Agitation describes the movement of developer across the surface of the film. Agitation sweeps the spent developer from the surface of the film and replaces it with fresh chemicals. The rate at which the exhausted chemical is replaced is dependent upon how vigorous the developer is agitated. Agitation is the most difficult of the processing variables to control and hand agitation is nearly impossible to maintain in a consistent manner. Automatic tray rockers of various designs are available; they greatly improve the control of this variable.

C. Compensating for uncontrolled variables: The calibrated gray scale, exposed along side of the copy, can be used as a visual densitometer to compensate for non-controlled variables. The effects caused by hot or cold developer, weakened developer, or irregular agitation can be negated to a great extent by visually surveying the gray scale as it develops along with the copy.

D. Safety cautions of photographic processing

1. Provide adequate darkroom ventilation.

2. Wear eye protection when using or mixing chemicals.

3. Protect skin from extended contact with photographic chemicals.

E. Exposure: (See Units V and VII) Ideal or basic exposure times must be made and tested within the consistency of the processing variables of time, temperature, agitation and chemical strength. Exposure exists as a combination of shutter speed and shutter aperture.

F. Manual processing procedures

1. Preparing chemicals in trays (HO 1)

2. Processing lith film (HO 2)

G. Purposes and descriptions of processing chemicals

1. Developer
    a. Alkaline; ph > 7
    b. Changes the exposed silver salts (halides) on film to black metallic silver
    c. Has little effect on unexposed silver halides
2. Stop bath
    a. Acidic; ph < 7
    b. Neutralizes the alkaline developer and halts the chemical action
    c. Protects the fixer from developer contamination and neutralization
3. Fixer (also called hypo)
    a. Acidic; ph < 7
    b. Dissolves the unexposed silver salts (halides) from the film; has little effect on black metallic silver
    c. Contains hardener to firm up gelatin emulsion to resist scratches and nicks
4. Wash
    a. Water - neutral; ph = 7 (approximate)
    b. Removes loosened and dissolved unexposed silver salts and fixer from film; inadequate washing can leave unexposed silver halides on film which may be exposed and make spots.

H. Manual processing equipment

1. Trays (stainless steel preferred)
2. Timer (sweep second)
3. Processing sink (temperature controlled)
4. Tray and tank thermometer
5. Measuring graduate or cup
6. Plastic tongs or gloves

    7. Safety glasses

    8. Plastic apron

    9. Squeegee

    10. Inspection light

    11. Film dryer or drying line

    12. Engraver's lupe

    13. Automatic agitator or tray rocker

    14. Safelight

I. Manual processing of rapid access materials

    1. Rapid access materials tray processed same as lith film

    2. Temperature and time not critical

    3. Quality controlled by exposure

    4. Relatively new technology that is rapidly replacing lith film for most uses

    5. See additional rapid access information in this outline under "Automatic Processing" and in Unit V "Exposing With a Camera."

J. Reduction: Overdeveloped photographic materials may be reduced to "open up" the image using a chemical called reducer. Farmer's reducer is probably the best known of these chemicals. In general, the time and expense of this process is unwarranted; re-exposure and reprocessing is more economical.

II. Automatic Processing of Photographic Material

A. General information: The term "automatic" processing means that a machine controls the processing variables that are so critical and difficult to maintain with consistency during the manual processing of photographic materials. Several types of photo products can be processed with automatic equipment. Each type presents its own unique set of requirements and problems. In general, automatic processing produces a more consistent and higher quality product than manual processing of the same material.

B. Lith processors

1. Deep tanks reduce surface oxidation.
2. Developer strength is controlled by automatic replenishment.
3. Developer time is controlled by speed of film through machine.
4. Agitation is accomplished through the use of circulation pumps.
5. Temperature of the solutions is controlled by thermostatically controlled heating and cooling.
6. Wash is water circulated by pump.
7. Automatic drying occurs with warm, forced air.
8. Processing from dry-to-dry is 6 to 12 minutes.
9. Processor frees worker for other tasks while machine processes film.
10. Monitor the processor with control strip.
    a. Control strips are strips of film pre-exposed by the processor manufacturer and are used to check the processor output quality.
    b. When processed, these control strips are "read" and evaluated. Density readings are made of specific steps of these processed strips. Readings are recorded and compared to manufacturer's recommendations. Replenishment rates are altered to bring the processor "into control."

C. Rapid access processors

1. Shallow tray, straight line transport
2. High temperature processing increases speed of processing.
3. The processing of rapid access materials, characterized as reaching maximum density, is based on exposure and cannot be overdeveloped.
4. Does not need replenishment system
5. Relatively new technology that is rapidly replacing lith film in many applications

6. Traditional variables are not as critical with rapid access materials, thereby permitting a simpler, less expensive processor.

7. Chemistry is prepackaged containers of developer and fixer. Plumbing is usually required.

8. Automatic drying is available on most rapid access machines.

9. Halftone quality is not as high as with lith process, but it is rapidly improving with research.

D. Stabilization processors

1. The stabilization process is rapidly being replaced by rapid access materials and processors.

2. The processor is a two bath machine that uses a simple roller transport system to dampen exposed stabilization materials first, with activator and then, stabilizer.

3. Stabilization materials are manufactured with the developer built into the emulsion. The critical ingredient of activator is left out. Development occurs when exposed materials come into contact with the activator. (Solution 1)

4. Stabilizer (Solution 2) replaces fixer in the process.

5. The resulting product is unstable; it may fade or turn dark if no washing takes place to remove the unexposed, light sensitive material.

6. The processor is a simple, inexpensive, motorized machine.

7. If permanence is required, the product may be fixed, washed and dried like conventional photographic materials.

E. Diffusion transfer processors

1. Uses

   a. Proofs

   b. Copy preparation materials prints

   c. Film positives

        d. Reverses

        e. Litho plates

        f. Reproduction of illustrations

    2. Materials

        a. Two parts

            (1) Negative camera material is light sensitive.

            (2) Receiver material, paper or transparent film, is coated to receive silver image from negative material.

    3. Also called PMT™ (Eastman Kodak) "Photo-Mechanical Transfer"

    4. The processor is a one bath activator machine. (HO 3)

        a. Baffle to keep negative material and receiver separated until both are wetted by activator.

        b. Two motor-driven outfeed or squeegee rollers force contact between the negative and receiver with the activator sandwiched between.

        c. Separation of the completed diffusion transfer positive (print/film) and negative is done by hand.

    5. Litho plate may be made with process, although not widely used. (See TM 1; Unit X lesson 1)

    6. Output quality dependent upon:

        a. Chemical age

        b. Exposure

    7. An activator that is left on print to dry may turn print yellow with age. Print may be rinsed and dried like conventional RC photographic print.

III. Summary and Conclusion

A. Manual processing of photographic material

B. Automatic processing of photographic material

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VI : PROCESSING PHOTOGRAPHIC MATERIAL

INTERACTION ITEMS:

1. Why is it important to control the processing variables?
2. Describe what happens when the developed film is placed in the stop bath. Why?
3. Why do larger graphic arts companies use automatic processors?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VI: PROCESSING PHOTOGRAPHIC MATERIAL

EVALUATION ITEMS:

Completion: Fill in the blank from the list of words provided.

1. __________ dissolves the unexposed silver salts from the film.

2. __________ __________ is acidic and neutralizes the developer on the film.

3. If all four of the processing __________ are not controlled, the resulting negative quality will be unpredictable.

4. Underdevelopment may be caused by the developer being too __________ or too __________.

5. One way to assure that the negative quality is of consistently high quality is to use a(n) __________ __________.

6. There are __________ __________ that must be controlled in film processing.

7. The purpose of the __________ is to change light exposed silver salts to black metallic silver.

8. Automatic processors are popular because they __________ __________ and control the processing __________.

9. Stabilization processing is fading in importance because of the popularity of __________ __________processing.

10. __________ removes the fixer and the dissolved, unexposed silver salts from the surface of the film.

11. Stabilization processing uses a machine in which two chemicals, __________ and __________, process the material.

12. __________ is the only chemical required in diffusion transfer processing.

13. __________ __________ processing is quickly becoming the most popular of automatic processing; it is replacing lith processing in many applications.

14. A hazy or dirty background in a diffusion transfer print indicates __________________.

15. A light or broken image in a diffusion transfer print indicates ________________.

16. The most difficult of the four processing variables to control when processing by hand is __________.

17. One way to compensate for uncontrolled variables in manual processing is to use a __________ __________.

18. Fixer's pH is __________.

19. Developer's pH is __________.

20. Stop bath's pH is __________.

21. Overdeveloped lith film may be corrected using a chemical called _______.

22. Automatic lith processors are monitored by processing pre-exposed __________ __________.

23. __________ processors produce a product which, in time, will turn dark because no washing is done.

24. The __________ __________ process finds its greatest use in the area of copy preparation, although film positives and plates may also be produced by this process.

25. __________ and ______________ is very important when mixing lith chemicals for manual processing.

Words

accuracy
reducer
fixer
water
cleanliness
overexposure
alkaline
rapid access
cold
stop bath
stabilization
gray scale
weak

activator
variables
stabilizer
four variables
save time
agitation
underexposure
developer
diffusion transfer
automatic processor
acidic
control strip

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VI : PROCESSING PHOTOGRAPHIC MATERIAL

ANSWERS TO EVALUATION ITEMS:

1. fixer
2. stop bath
3. variables
4. cold, weak
5. automatic processor
6. four variables
7. developer
8. save time, variables
9. rapid access
10. water
11. activator, stabilizer
12. activator
13. rapid access
14. underexposure
15. overexposure
16. agitation
17. gray scale
18. acidic
19. alkaline
20. acidic
21. reducer
22. control strip
23. stabilization
24. diffusion transfer
25. accuracy, cleanliness

Preparing Chemicals for Lith Film Tray Processing

1. Clean all trays and measuring utensils.

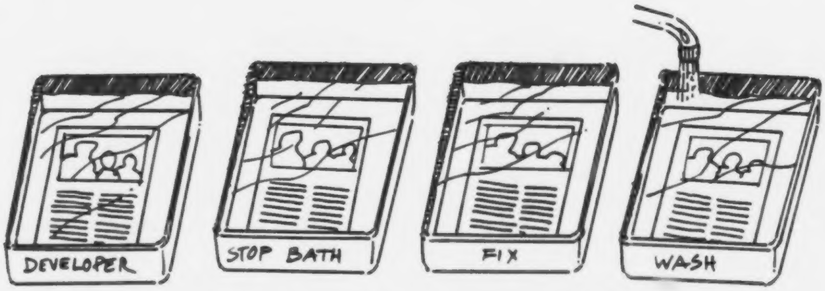
2. Set up four trays in order either on the counter or in the processing sink.

3. Mix developer for first tray.
    a. Dilute concentrated or stock solution of "A" developer with three parts water to one part developer. Pour it into the first tray.
    b. Dilute concentrated or stock solution of "B" developer with three parts water to one part developer. Add "B" solution to the diluted "A" solution in tray to make a working solution of lith developer.
    c. Lith developers also come in powdered form and must be mixed to make working solutions. Always follow the manufacturer's recommendations exactly when mixing photographic chemicals.
    d. The amount of developer mixed depends upon the tray size used. Example: 16 ounces of working solution should be adequate for an 8"x 10" tray.
    e. Always rinse measuring containers after use to avoid contamination.

4. Measure stop bath.
    a. A working solution of acidic stop bath will usually be available to you. Measure enough working solution of stop bath to fill the second tray to a depth of 3/8" to 1/2."
    b. If you need to mix stop bath solution, follow all recommended procedures of the manufacturer. Do not attempt to mix glacial acidic acid with water without the aid of your instructor.

5. Measure fixer.
    a. Pre-mixed fixer solution should be available to you. Measure enough of your fixer (hypo) working solution to fill the third tray to a depth of 1/2" to 3/4."
    b. If you need to mix fixer, follow the manufacturer's directions for dilution and for adding the hardener.

6. Arrange the trays in the following order from left to right:
    1. Developer
    2. Stop
    3. Fixer
    4. Wash



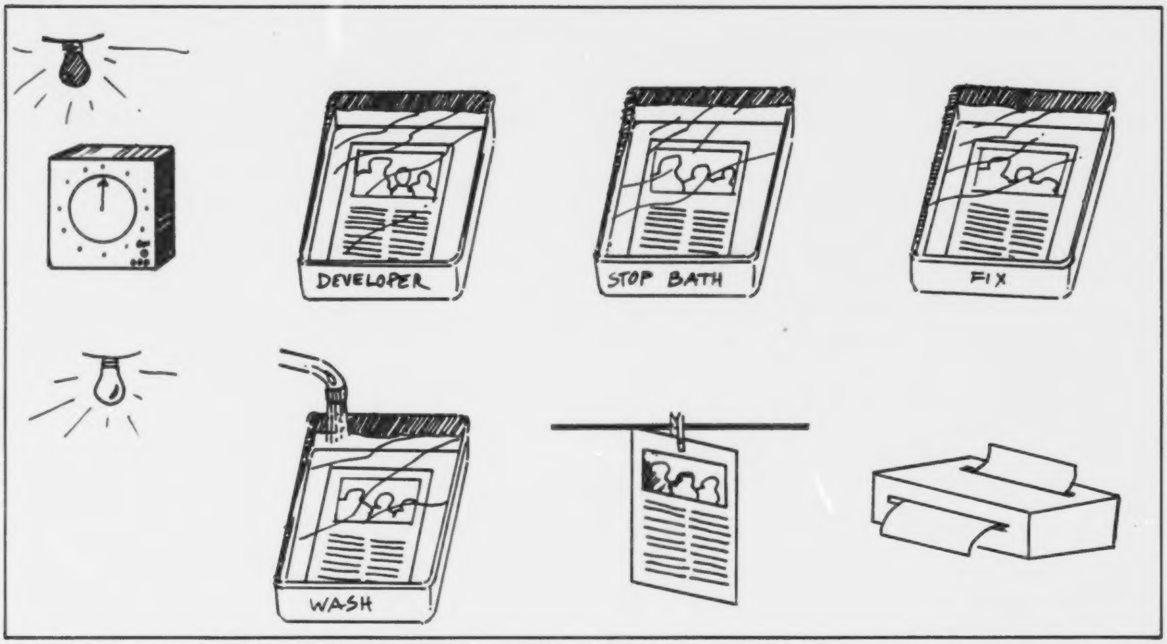
7. The wash tray should be set to the right so the water can be changed rapidly. A tray siphon, hose, or wash sink is satisfactory.

8. Clean up.
    a. After processing is completed, the exhausted developer should be disposed.
    b. The stop bath may be saved by covering the tray to prevent excessive evaporation.
    c. Save the fixer by covering the tray overnight. Good fixer may be saved over the weekend by storing it in a tightly capped bottle. Exhausted fixer should be saved in a covered bucket so the silver in the solution can later be recovered.
    d. Wipe up the work area with a damp sponge or cloth. Rinse empty tray and measuring tools. A dirty, chemically spotted work area can cause unpredictable photographic results.

HO 2

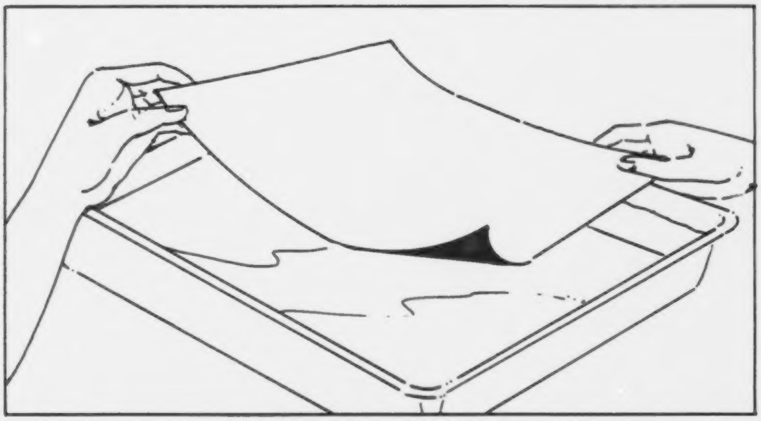
Processing Lith Film

1. Be sure chemicals are properly mixed and work area is laid out in order and protected by red safelights. (See HO 1)



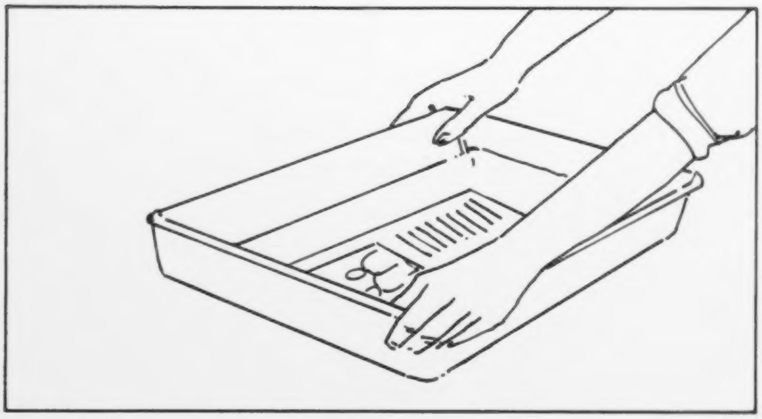
2. Set timer. Developing time depends upon the time used in the film/camera calibration test. (See Unit V) Most manufacturers recommend 1¼ to 2½ minutes.

3. Emerse exposed film into the developer, Tray One. Start timer. (alternate methods)
   a. Tip tray to concentrate developer in one end. Slide film (emulsion side up) into developer; quickly rock tray allowing developer to cascade across emulsion, wetting it at once. or,
   b. Drag film (emulsion side down) under the surface of the developer, then flop film over to emulsion side facing up.



   c. Agitation should begin immediately after film emersion.
   d. If gray scale method of controlling development is being used, observe it (emulsion side up) during processing.

e. Agitate developer tray consistently and constantly. Tip the tray from each side and each corner. Agitation should not be so vigorous as to simply move the tray under the developer. It should be deliberate, thus causing the developer to cascade across the film and then return.



f. True indication of complete and quality development is image quality. However, a solid Step Four on a 10-Step gray scale, when viewed under red safelight conditions, is usually an indication of sufficient development. The exact step to target on a gray scale depends upon the copy quality.

g. When pre-determined time expires (or gray scale target is reached) remove film from developer. Emerse at once in stop bath. Developing continues to take place while transferring negative from tray-to-tray, so work quickly.

4. Emerse developed film into stop bath, Tray Two.
   a. Agitate stop bath solution with developed film for 5 to 10 seconds.
   b. Re-examine the negative (and/or gray scale) for quality. If satisfactory, remove to fixer.
   c. If re-examination shows need for additional development, rinse negative completely in water and return to developer. If stop bath is carried back to the developer tray on film or hands, it will seriously deplete the strength of the developing solution.

5. Emerse developed film into fixer, Tray Three.
   a. Emerse film in fixer and agitate.
   b. When film clears (loses its milky haze), leave in fixer for a similar amount of time (For example, leave in fix twice the time it takes to clear.)
   c. Transfer film to wash bath.

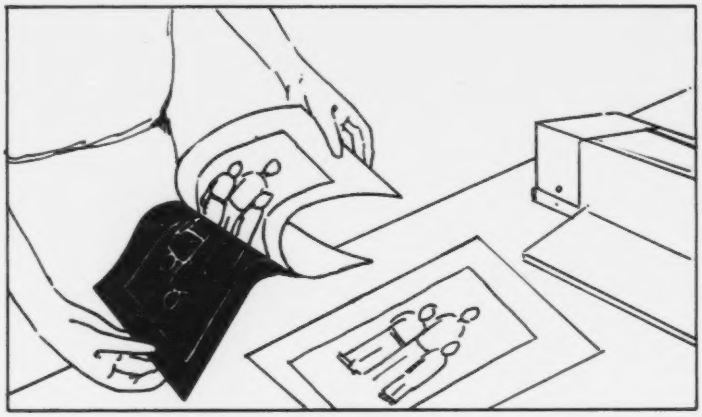
6. Emerse developed-fixed film into wash, Tray Four.
   a. Wash negative in rapidly moving water according to manufacturer's recommendations.
   b. Twenty minutes is usually sufficient time for washing if water is not too cold. Recommended water temperature is near 68° F.
   c. Some modern (polyester-based) film requires less washing time.

7. Dry processed film.
   a. Hang to dry in dust free area. Do not allow negatives to touch as they dry. or,
   c. Use film dryer.

HO 3

Making a Diffusion Transfer Print

1. Select suitable copy to expose on process camera. (See Unit V) Line work or halftones may be produced by this process.

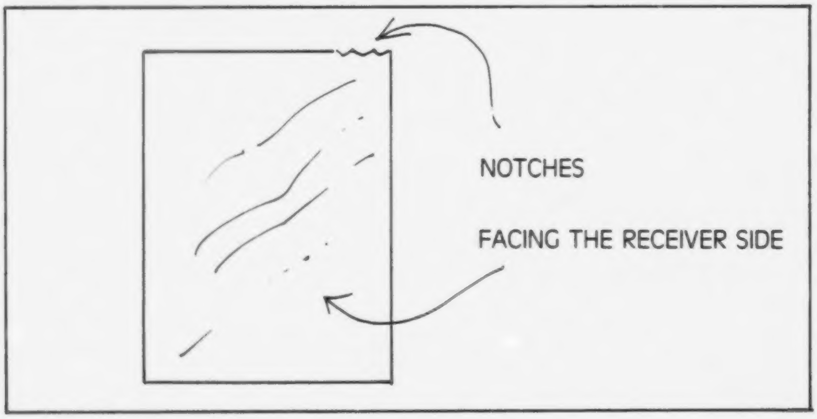


2. Exposure times are critical.
   a. Background haze or "dirt" in the resulting print denotes underexposure.
   b. Light or broken image in the resulting print denotes overexposure.

3. Expose negative material on camera. Dark gray or black side is light sensitive and must face the copy during exposure. NOTE: Diffusion transfer materials may also be used on the contact frame to make duplicates of film negatives and positives. The light sensitive side must face the exposure lamp.

4. Remove exposed negative material from camera.

5. Place dark side of exposed negative material against the shiny side of the receiver.
   a. To test the receiver side of the receiver material, pinch the corner for approximately 10 seconds. Your body heat will cause the receiver side to become slightly tacky.
   b. Transparent receiver is marked with notches at the corner. When held so the notches are in the upper right corner, you are facing the coated receiver side.



6. Turn on the diffusion transfer processor and allow to run for five to ten seconds. Residual chemicals sometimes cause the outfeed rollers to be stuck together. This may necessitate turning by hand and wiping the rollers clean.

7. Separate the leading edges of the negative and receiver; place them in machine so baffle is between the sheets.

8. Squeezing the tails of the two sheets tightly together, smoothly advance them into the activator bath and into contact with the outfeed rollers.

9. When the outfeed rollers start to pull the two sheets, release the tail ends.

10. Catch the laminated sheets as the outfeed rollers squeeze them together. Do not flex or bend them because this will disturb the image transferring process.

11. Lay the sandwiched sheets on a flat surface for 30 seconds.

12. Peel apart the two sheets and discard the negative.

13. The resulting high quality print may be washed to preserve the white background.

14. Film positives may be made the same way using transparent receiver rather than paper receiver.
    a Leave film and negative in contact for two minutes before peeling.
    b. Wash and dry film positive.

ASSIGNMENT SHEET 1 - SHOWING THE EFFECTS OF UNCONTROLLED VARIABLES ON PROCESSING

1. Expose one piece of 10"x 12" litho film through a halftone contact screen. Use the halftone flashing lamp to obtain approximately 20% dot under normal processing.
2. Cut exposed film into six equal 4"x 5" pieces. Place in light-tight box.
3. Set up processing line using a 4"x 5" tray for developing.
4. Process negative number one, accurately controlling all variables of time, temperature, agitation, and developer strength. Fix, wash, and dry negative number one and label it "standard."
5. Remove film number two from the box (close box) and expose to white light. Process this piece of film in the same developer used for negative number one. Develop until maximum density is achieved. Discard this piece of film. Developer should now be somewhat depleted in order to test developer strength variable.
6. Remove film number three from box (close box) and process in same developer as used for negatives one and two. Control time, temperature, and agitation variables. Fix, wash, and dry this negative and label "weak developer."
7. Mix fresh developer. Process film number four and control the variables of time, temperature, strength of developer, but do not agitate. Fix, wash, dry, and label "no agitation."
8. Mix fresh developer. Process film number five and control all variables except time. Develop for 50% longer than control negative. Fix, wash, dry, and label "extra time."
9. Mix fresh developer. Process film number six and control all variables except temperature. Change temperature at least 5° F. from normal to more dramatically show the effect of temperature. Fix, wash, dry, and label "warm (or cold) developer."
10. Arrange all five completed negatives on a light table; compare each with the standard negative which was processed with all variables under control. Differences in the negatives should be visible with the naked eye. Transmission densitometer readings, however, should be made of each negative in order to have a numerical value to compare.
11. Using these negatives and the density readings from each, discuss with the group how each variable is important and what effect it had on the results when it was allowed to vary. Discuss how an automatic processor could resolve these problems of variable control.
12. If an automatic processor is available, run the stnadard negative through the processor and compare it to the others. Do not change the time, temperature, or chemical agitation rate on the processor.

(See Unit V for use of the densitometer.)

ASSIGNMENT SHEET 2 - SHOWING ADJACENCY EFFECT IN PROCESSING

1. Expose a 5"x 7" piece of film through a halftone contact screen. Use the halftone flashing lamp to obtain approximately 20% dot under normal processing.
2. Remove screen. Cover approximately half of the film with black, opaque paper, then expose it to white light.
3. Process normally; control all variables but do not agitate the developer. Fix wash, dry, and label "adjacency effect."
4. Place negative on light table and note "adjacency effect." Screen pattern will vary as it gets closer to the exposed solid. This variance is caused by the developer being more active, thus becoming exhausted in the development of the solid.
5. Discuss with group how agitation can minimize this problem.

AS 3

ASSIGNMENT SHEET 3 - SHOWING THE EFFECTS OF INADEQUATE WASHING

1. Expose a 5"x 7" piece of film through a halftone contact screen. Use halftone flashing lamp to obtain approximate 20% dot with normal processing.

2. Process normally, but do not wash. Drain excess fixer from negative and allow to dry. Label negative "no wash."

3. Hang dried negative in lighted area (preferably sunlight) for about one week.

4. Examine negative on the light table. Discuss:
   - What are the spots, splotches, smudges, etc?
   - How does complete washing avoid these?

ASSIGNMENT SHEET 4 - PROCESSING A LINE NEGATIVE

(Note to Instructor: This assignment can be combined with assignments from Unit V, Exposing with a Camera.)

1. Using a pre-exposed line negative supplied by your instructor, process as demonstrated.
    - Develop to the fourth step of gray scale.
    - Develop with emulsion up.
2. After processing is complete and negative is dry, discuss the results with your instructor.
3. Did the gray scale compensate for the variables you didn't control?

ASSIGNMENT SHEET 5 - PROCESSING HALFTONES

(Note to Instructor: This assignment can be combined with assignments form Unit V, Exposing with a Camera.)

1. Using a pre-exposed halftone negative supplied by your instructor, process as demonstrated. Control all variables of time, temperature, chemical strength, agitation, etc.
2. After processing is complete and negative is dry, discuss the results with your instructor.
3. Is this a good negative, or are the dot values less or greater than desired? Can this negative be improved? How could you change the processing to improve this negative?

ANSWERS TO ASSIGNMENT SHEETS 1, 2, 3, 4, AND 5
SHOWING THE EFFECTS OF UNCONTROLLED VARIABLES ON PROCESSING
SHOWING ADJACENCY EFFECT IN PROCESSING
SHOWING THE EFFECTS OF INADEQUATE WASHING
PROCESSING A LINE NEGATIVE
PROCESSING A HALFTONE

The instructor should evaluate all assignment sheets on an individual basis according to criteria set in this unit.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VII : CONTACTING

SCOPE OF UNIT:

Contacting is simply creating a new film or paper image by exposing through a film original (positive or negative) held in tight contact with a light sensitive material (film or paper). It is recommended that this unit be taught in conjunction with Units V and VI. Much information necessary to comprehending contacting is contained therein.

INFORMATION TOPIC: VII-1 OR DEMONSTRATION:

CONTACTING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify contacting equipment by name.
2. Describe two types of contacts.
3. Draw three types of film to original orientations.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1.	TM 1:	Contacting Diagram
2.	TM 2:	Control Strips for Contacting
3.	HO 1:	Original to Film Orientation for Contacting
4.	HO 2:	Determining Exposure Time
5.	HO 3:	Contacting Duplicates (Dupes)
6.	HO 4:	Making Contact Prints

7. HO 5: Contacting Spreads and Chokes

8. AS 1: Making a Right Reading Positive from a Camera Negative

9. AS 2: Making a Duplicate Positive with High Speed Duplicating Film

10. Video Tape GA-88-150: Contacting. Available from The Media Center, State Fair Community College, 1900 Clarendon Rd., Sedalia, MO 65301 (816)826-7100

INFORMATIONAL ASSIGNMENT: (Student)

Kagy, Frederick D. and J. Michael Adams. *Graphic Arts Photography*. North Scituate, MA: Breton Publishers, 1983, ch. 9.

REFERENCES:

Blair, Raymond N., ed. *The Lithographer's Manual*. 7th ed., Pittsburgh, PA: The Graphic Arts Technical Foundation, 1983, ch. 5.

INTRODUCTION:

Contacting, in all but the simplest of jobs, is an important aspect of the film assembly process. It should be studied as part of Units V and VI and be reviewed in conjunction with Unit VIII. Contacting, for the most part, is either performed directly by the film assembly technicians (strippers) or under their direction.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VII : CONTACTING

OUTLINE: (Key Points)

I. Definition and Description

   A. Process of creating new image

   B. Uses light sensitive film or paper

   C. Expose with light through an original film negative or positive

   D. Process requires the original and the receiver to be held in tight contact, hence, the name "contact"

   E. Device to maintain contact is a pressure device or vacuum frame, vacuum frame is most commonly used in graphic arts.

   F. The product is called a "contact" and the process is called "contacting."

   G. Uses of contacting in graphic arts:

      1. To make duplicate negatives or positives
      2. To make negatives from positives
      3. To make positives from negatives
      4. To make laterally reversed negatives and/or positives (change image orientation)
      5. To make hard dot halftones from camera halftones
      6. To make paper prints and proofs
      7. To make composite negatives and/or positives from multiple stripped flats
      8. To make spreads and chokes
      9. To make multiples images by step and repeat
      10. To make screened tints
      11. To make screened prints

12. To make direct screen color separations

13. To make screened positives from continuous-tone color separations

14. To make color correction and contrast control masks for color separations

15. To make pre-press proofing

H. Typical graphic arts contact types

1. Conventional

   a. Negative original is used to produce a positive reproduction, or a positive original is used to produce a negative reproduction.

   b. The original is usually transparent base film and the reproduction is usually film or paper.

2. Duplicate (dupe)

   a. The product or reproduction is the same as the original. That is, a negative is produced from a negative original and a positive is produced from a positive original.

   b. Original is usually film; reproduction is usually film but it could be paper or proofing material.

   c. Making duplicates requires special film called "duplicating film." Although its sensitivity is slower than regular lith film or contact film, ordinary contacting equipment may be used.

II. Contacting Equipment

A. Contact frames

1. Glass top vacuum frame

   a. Rubber blanket presses against glass cover.

   b. Air is extracted by vacuum pump.

2. Open-face vacuum frame

   a. Original must be larger than reproduction film. (or)

b. Original and reproduction film must be covered with transparent film such as mylar.

c. Other

(1) Using vacuum back of camera as makeshift open-face vacuum frame

(2) Using mechanical pressure device to achieve contact (not satisfactory for most graphic arts applications)

(3) Using platemaker vacuum frame as contacting frame, need low intensity light for most materials

B. Contact exposure lighting and control

1. Actinic light is any light that exposes light sensitive emulsions; types of actinic light are explored in detail in Unit V. Differences between lighting systems used for exposure on cameras and those used for contacting are predominantly in the methods of control.

2. Point-source light uses a low voltage, single source light bulb which produces the "straightest" beam with the least amount of light spread and light "fall-off" at the edges. Commercially available point-source lights come with:

a. Voltage controls; three or six tap voltage controls provide a variety of light intensities for a variety of light sensitive materials.

b. Timers; for most darkroom or room-light contacting, a 60-second mechanical or electronic timer is necessary.

(1) Turns exposure unit on and off automatically

(2) Provides repeatable exposure duration control

3. Quartz light provides a 600-watt to 1000-watt, broad beam, high UV exposure for slower emulsions. Most room-light materials require a high intensity light source such as this quartz-iodine lamp. It can be controlled by timer also.

4. ND (neutral density) filters

a. Gray, continuous-tone filters are placed in front of point source light to reduce intensity.

b. They are used to lengthen exposure when exposure time is too short (less than 10 seconds) to accurately control.

c. Neutral density is calibrated in logarithms and the amount of light units reduced by them is predictable.

ND Filter	Time Extended
.1	1.25 x exposure time
.2	1.60 x exposure time
.3	2 x exposure time
.6	4 x exposure time
1.0	10 x exposure time

5. Safelights for contact areas

a. For orthochromatic materials: red 1A safelight filters

b. For highspeed duplicating film: red 1A safelight filters

c. For daylight materials: subdued incandescent room light or yellow florescent lamps

III. Contact Processing: Processing of contacted film is identical to all high contrast materials. All recommendations of the manufacturer should be followed. (See Unit VI)

IV. Making Contacts - Procedures

A. Setup of exposure lamp, original and film (TM 1)

1. Orientations (HO 1)

a. E to E means emulsion to emulsion: the emulsion of the original is against the emulsion of the unexposed film (paper).

b. B to E means base to emulsion: the base of the original is against the emulsion of the unexposed film (paper).

   c. E to B means emulsion to base: the emulsion of the original is against the base of the unexposed film (paper).

2. Right reading vs. wrong reading

   a. Right reading: a negative or positive, when viewed through the base, reads forwards and correct.

   b. Wrong reading: a negative or positive, when viewed through the base, reads backwards and incorrect.

   c. A camera negative of normal copy will be "right reading."

   d. A complete understanding of the concept of right reading/ wrong reading is important. Different applications require different types of positives/negatives. The product being produced and the types of sensitized material being used can dictate which to use.

   e. Examples:

      (1) An E to E contact made from a right reading negative will produce a wrong reading film positive.

      (2) An E to B contact made from a right reading negative will produce a right reading film positive.

      (3) An E to E contact made from a right reading negative will produce a right reading positive print.

B. Operation

1. Glass and film cleanliness is important.

2. Wait for complete drawdown.

   a. Be sure all air is extracted from vacuum frame.

   b. Be sure all film is in tight contact; no dirt or foreign matter should hold films apart.

   c. Be sure light intensity and time are properly set as determined by basic exposure test. (HO 2)

3. Contacting duplicates (HO 3)

4. Contacting reverses and film positives

    a. Right reading positive - contact B to E

    b. Reverse for stripping - contact B to E

5. Contacting lateral reversals (wrong reading positive or negative) contact E to E with duplicating film

6. Contacting paper proofs or prints - made from right reading negative E to E (HO 4)

7. Making spreads and chokes by contact (HO 5)

    a. Spreads are a negative or a positive in which the image has been swelled or fattened to enable the stripper and/or press operator to more easily fit it to its reverse image.

    b. Chokes are a negative or positive in which the image has been shrunk or made skinny to enable the stripper and/or press operator to more easily fit it to its reverse image.

    c. Spreads and chokes are necessary for multicolor work when one color image has to fit within the image of another color. The image of the lighter color is usually spread or choked to allow its overlap with the darker image which maintains the image shape.

    d. Spreads and chokes can be made by contacting either negatives or positives to film with clear film spacers between the original and the unexposed film. This space allows the image-making light to spread, thus spreading the image. If contacted from positive to negative, the image will choke.

    e. Beyers Micro-Modifier TM - Spread and chokes can also be made using a machine called a Micro-Modifier TM. This machine requires no spacers; it spreads the image by slightly oscillating the negative in relation to the unexposed film.

    f. Outline letters can be made using spacers between the original and the unexposed film, much the same way that spreads and chokes are made. Outline letters require that several contacts be made.

V. Summary and Conclusion

   A. Definitions and descriptions

   B. Contacting equipment

   C. Contact processing

   D. Making contacts - procedures

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VII : CONTACTING

INTERACTION ITEMS:

1. Why is it important that there be no space between the original and the unexposed film when contacting?
2. What is the purpose of the contacting control strips?
3. Explain duplicating film. What is its purpose?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VII : CONTACTING

EVALUATION ITEMS:

1. List the equipment necessary to make photographic contacts.
2. What kind of film do you need to make a contact negative from a film negative original?
3. What kind of film do you need to make a contact positive from a film negative original?
4. Draw diagrams of the three typical film to original orientations.
5. Describe, in general terms, the process of making spreads and chokes.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VII : CONTACTING

ANSWERS TO EVALUATION ITEMS:

1. **Exposure lamp**: A point-source light with intensity control and timer is preferred for most contacting. May need a quartz lamp for materials requiring a high intensity UV source.

   Contact frame: Glass covered vacuum frame is preferred, but open face vacuum frame or vacuum easel is satisfactory.

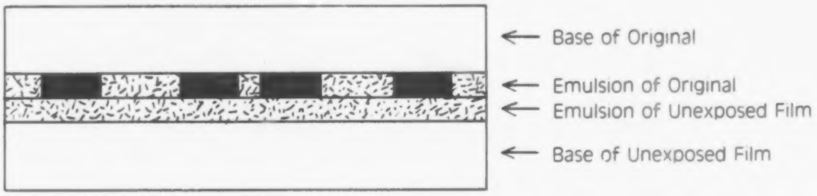
   Processing equipment: Either a process sink with accessories or an automatic processor is needed for the type of materials used.

2. Duplicating film

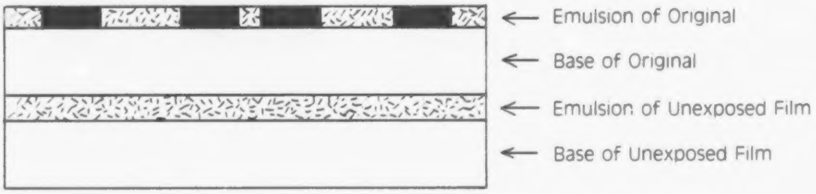
3. Lith film or contact film

4. Diagrams of three typical film to original orientations:

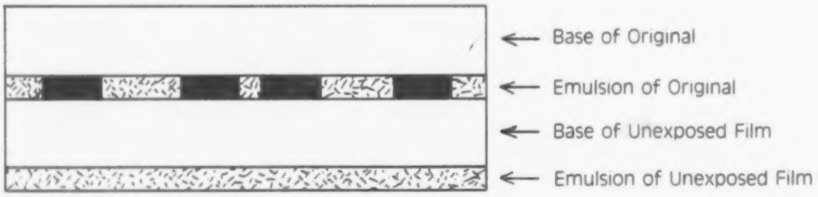
1 E to E · Emulsion to Emulsion


Base of Original
Emulsion of Original
Emulsion of Unexposed Film
Base of Unexposed Film

2 B to E · Base to Emulsion

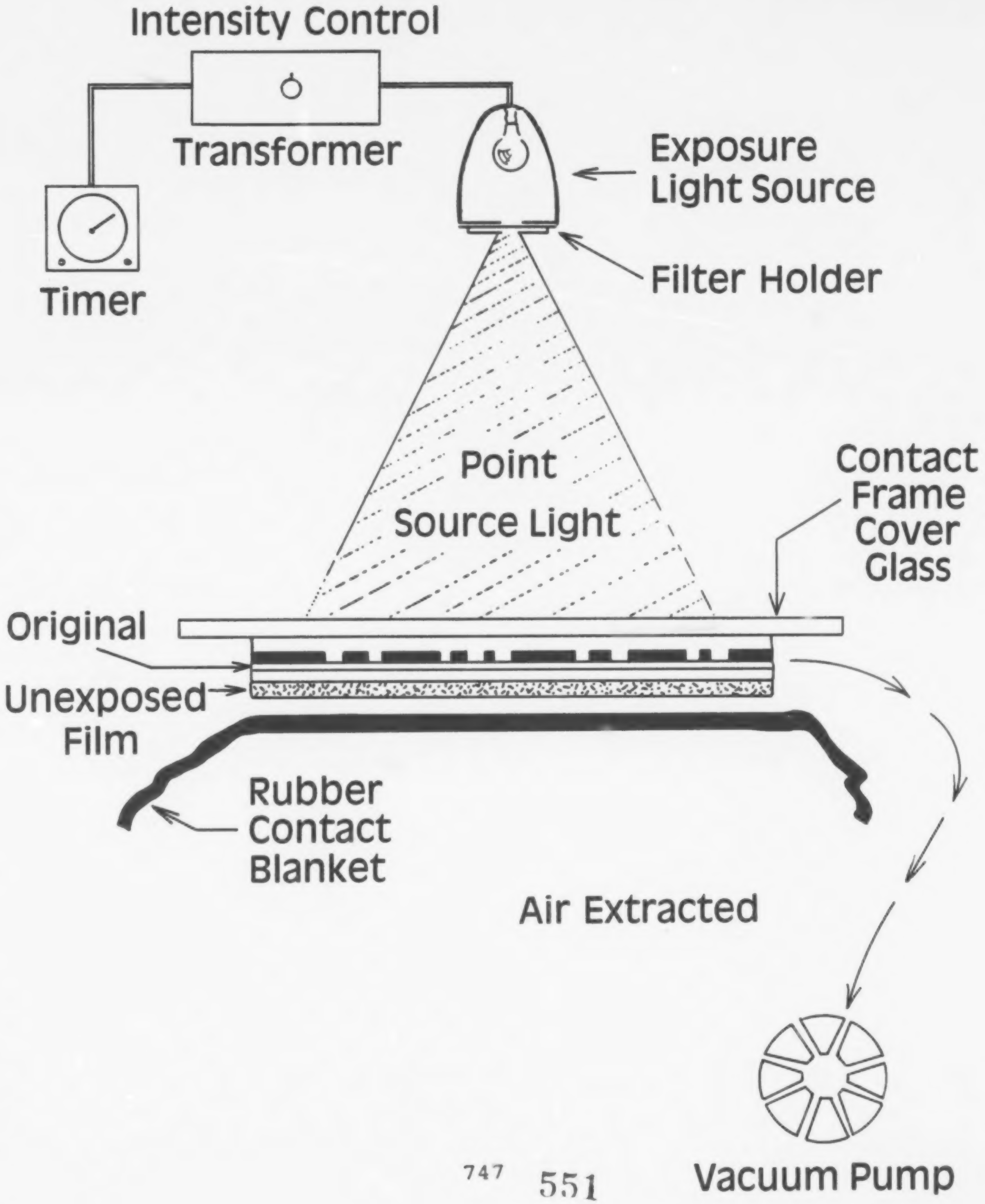

Emulsion of Original
Base of Original
Emulsion of Unexposed Film
Base of Unexposed Film

3 E to B · Emulsion to Base

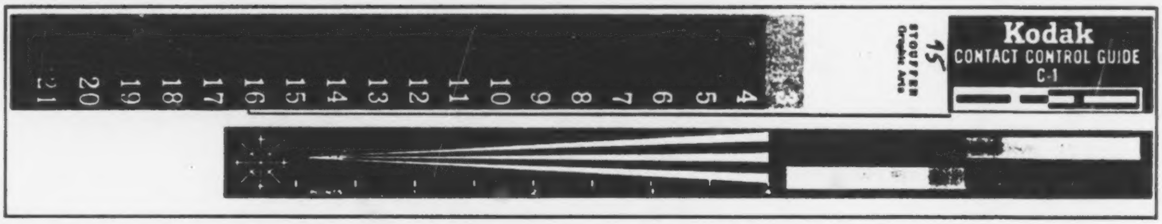

Base of Original
Emulsion of Original
Base of Unexposed Film
Emulsion of Unexposed Film

5. Spreads and/or chokes are, in general terms, expanded or shrunk images which are used to permit better fitting of one color to another. They are made by contacting an original negative or positive to a piece of unexposed film. Spacers of transparent film are placed between the original and the unexposed film to allow the light to spread. If the original is a film negative, the result will be a "spread." If the original is a film positive, the result will be a "choke."

Contacting Diagram


Intensity Control
Transformer
Timer
Exposure Light Source
Filter Holder
Point Source Light
Contact Frame Cover Glass
Original
Unexposed Film
Rubber Contact Blanket
Air Extracted
Vacuum Pump

Control Strips for Contacting


21
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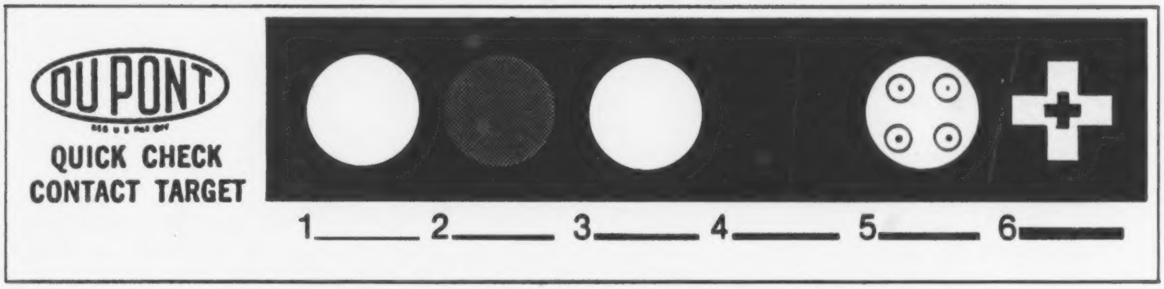
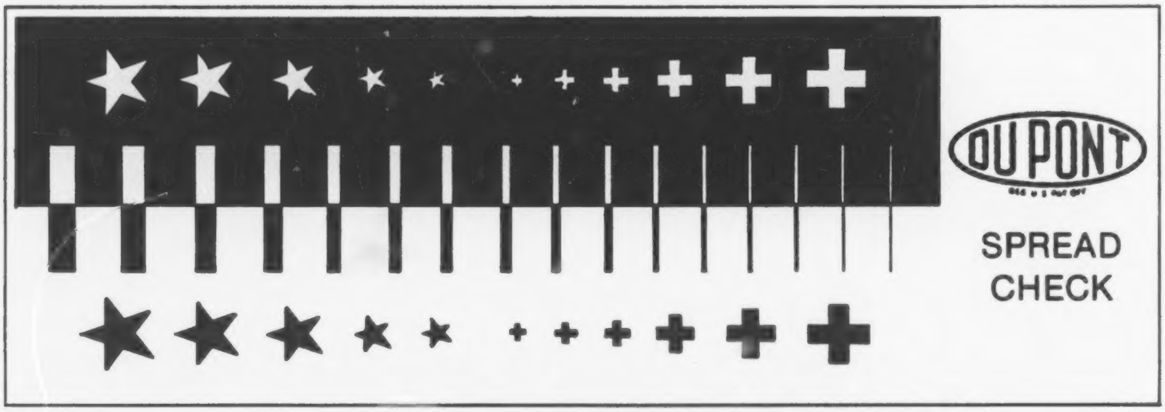
STOUFFER
Graphic Arts
Kodak
CONTACT CONTROL GUIDE
C-1

Stouffer Gray Scale with Kodak Control Guide C-1®


DU PONT
QUICK CHECK
CONTACT TARGET
1
2
3
4
5
6

DuPont Contact Control Target®

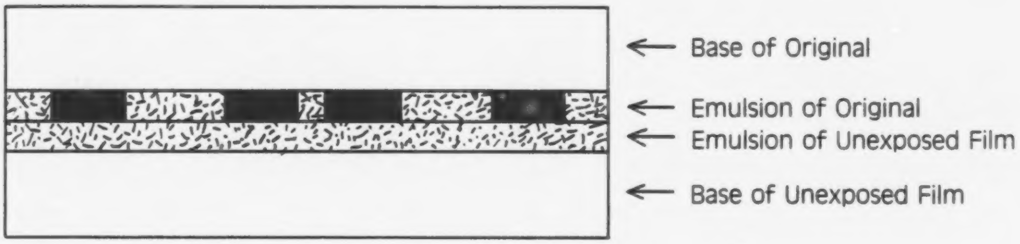

DU PONT
SPREAD
CHECK

DuPont Spread Check Target®

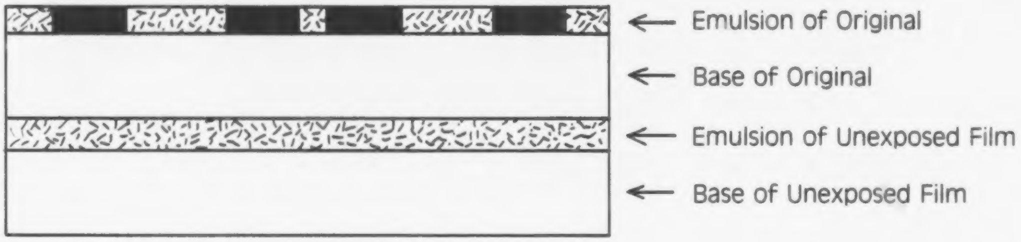
HO 1

Original to Film Orientation for Contacting

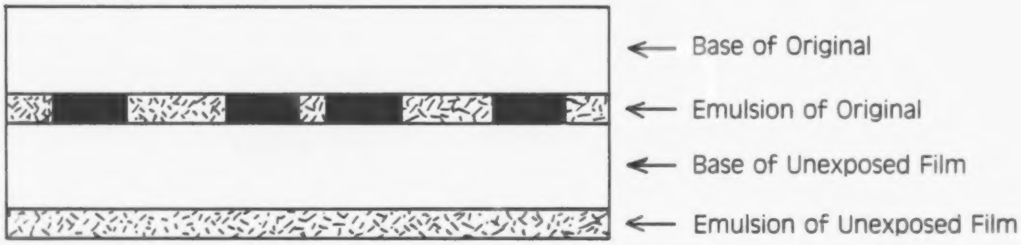
1. E to E - Emulsion to Emulsion


Base of Original
Emulsion of Original
Emulsion of Unexposed Film
Base of Unexposed Film

2. B to E - Base to Emulsion


Emulsion of Original
Base of Original
Emulsion of Unexposed Film
Base of Unexposed Film

3. E to B - Emulsion to Base


Base of Original
Emulsion of Original
Base of Unexposed Film
Emulsion of Unexposed Film

Determining Exposure Time

Each different type of film or sensitized material may have a different sensitivity and hence require a different exposure time. Each must be tested individually. Each film orientation, E to E, E to B, B to E, must also be tested.

Procedure:

1. Clean cover glass on both top and bottom.
2. Place matte black sheet of paper or cardboard in contact frame. (This is for antihalation purposes and will prevent the rubber draw-down blank from marking film.)
3. Place sheet of litho film (or other to be tested) on the black sheet, emulsion up.
4. Place contact target (TM 2) emulsion down on film. (E to E orientation) Cover balance of film with mask to prevent exposure.
5. Close cover glass; inspect for dirt.
6. Turn on vacuum pump; wait for complete draw down.
7. Set regulator on tap one and timer for five seconds. Expose.
8. Turn off vacuum; raise glass; move target to new position; remask film.
9. Repeat steps 5-8 with progressively longer exposure times of 10 seconds, 15 seconds, and 20 seconds.
10. Remove control strip; process the film. (See Unit VI) Dry test positive.
11. Evaluate the four test exposures to determine best time. Examine for:
    a. Dense black image
    b. Line thickness and quality the same as open lines on target strip
    c. Dots reproduced "dot-for-dot"
12. Examine the gray scale on the image determined to have the best reproduction time. The last solid step will become the processing target for future contacts made on that same material. A transparent gray scale should be included on each contact for use as a processing guide the same way a reflective gray scale was used with camera line copy. (See Unit V)
13. Keep accurate records or a chart of all exposure times for all materials.
14. If exposure time is less than 10 seconds on tap one, it will be necessary to:
    a. Move exposure lamp farther away from contact frame. or,
    b. Reduce light intensity with neutral density filter(s). (See ND chart in outline, II.B., Contact Exposure Lighting and Control.)

NOTE: The same procedure outlined here will be used for making production contacts; only one exposure, however, will be necessary.

Contacting Duplicates (dupes)

1. Duplicates can be made by contacting a negative to make a positive and then contacting the resulting positive to make a negative. This is called "going back and forth" and it is time consuming. If this process is to be used, follow the procedure outlined in HO 2 to make each contact.
2. Duplicating materials are available which will produce duplicates in one step; ie. a negative from a negative or a positive from a positive.
3. It is necessary to test the duplicating film for ideal exposure time. Record time on a chart. Test in same manner used in HO 2.
4. Dupe film has density (darkness) built into the film and the exposure removes it. (This is the opposite of lith film.) More exposure gives less density.
5. Daylight or room-light dupe film must be exposed with a high intensity quartz exposure lamp. High speed duplicating film may be exposed with the standard point-source light, although at a higher intensity than lith film.
6. Be sure to determine in advance the type of dupe you need, right reading or wrong reading, and set up the contact frame accordingly.
7. Processing for dupe film is the same as lith film.

Making Contact Prints

Proofs and paper prints are important products of contacting. Right reading positive prints are contacted from right reading negatives E to E.

A quick method of making contact prints is to use high contrast stabilization paper or high contrast rapid access RC paper. The latter is processed in a rapid access processor; the former in a stabilization processor. Either gives a high quality black on white print. (Unit VI)

1. Clean contact frame glass on both sides.
2. Place print paper emulsion up.
3. Place right reading negative on print paper E to E.
4. Close frame; turn on vacuum and expose.
5. Remove paper and process as above.

Contacting Spreads and Chokes (Also called "fatties" and "skinnies")

Spreads are photographically thickened images, usually letters, that are made from film negative originals.

Chokes are thinned or shrunk images contacted from film positive originals.

1. Clean contact frame cover glass on both sides.
2. Place unexposed film in frame on matte black sheet, emulsion up.
3. To make a spread: (Figure 1)
   a. Place spacers on top of unexposed film. The amount of space necessary may be determined by testing with a spread and choke target. (See TM 2) Spacers are sheets of transparent film.
   b. Place negative emulsion up on spacers.
   c. Close glass; turn on vacuum and expose.
4. Process film as taught in Unit VI.
5. If the end result is to be a negative, use duplicating film in Step Two. If a film positive is needed, use the lith film or contact film.

NOTE: To make a choke, start with a film positive original in Step Three (Figure 2). To get adequate spreading of light in making spreads and chokes, it may be necessary to expose the film longer than would be required for a normal contact.

Figure 1. Making a Spread

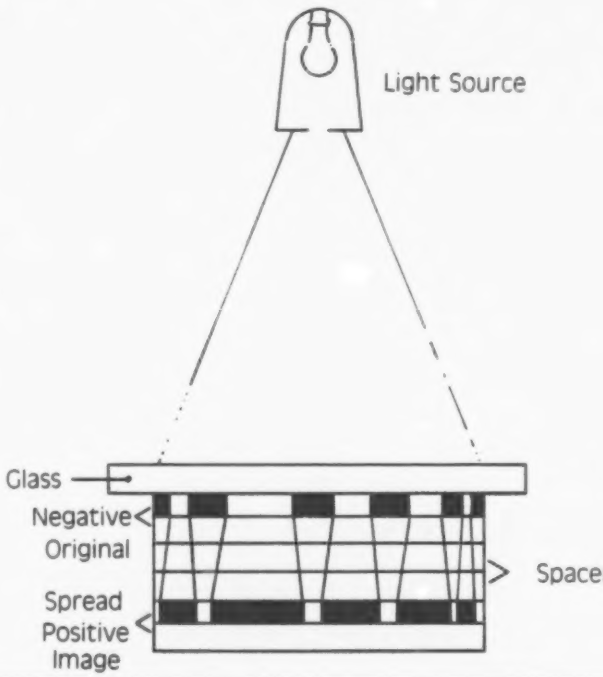
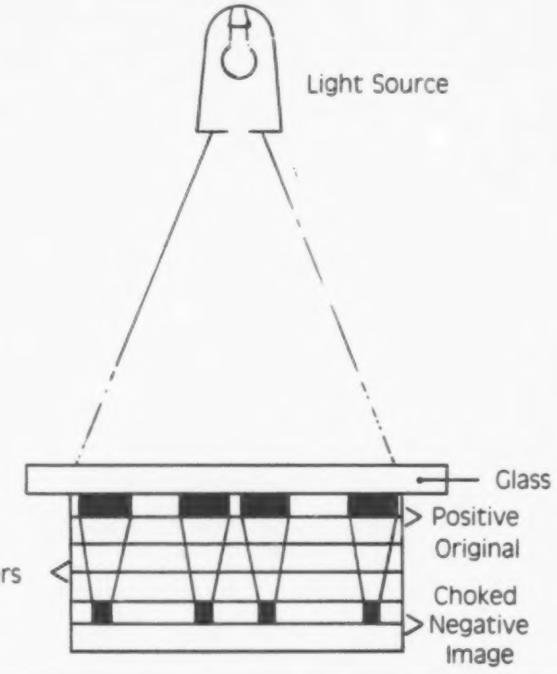

Light Source
Glass
Negative Original
Spread Positive Image
Spacers

Figure 2. Making a Choke


Light Source
Glass
Positive Original
Spacers
Choked Negative Image

ASSIGNMENT SHEET 1 - MAKING A RIGHT READING POSITIVE FROM A CAMERA NEGATIVE

1. Using a negative supplied by your instructor, make a right reading positive that can be assembled with other films for a reverse image.

2. Use the instructions supplied by the handouts given to you by your instructor.

   Fill out the following before your start:

   Type of Film to Use: ______________________________

   Exposure Time: ______________________________ seconds

   Voltage Tap (Intensity): ______________ No. ______________

3. NOTE: Be sure the glass is clean. Don't forget to use a contact guide strip. Process the same as a line negative.

4. After the contact has dried, place it on a light table or viewer and discuss it with your instructor.

ASSIGNMENT SHEET 2 - MAKING A DUPLICATE POSITIVE WITH HIGH SPEED DUPLICATING FILM

1. Using a film positive original supplied by your instructor, make a right reading duplicate.
2. Use the instructions supplied by the handout given to you by your instructor.
   Fill out the following before your start:

   Type of Film: ______________________________

   Exposure Time: ______________________________ seconds

   Voltage Tap (Intensity): ______________ No. ______________

3. NOTE: Be sure the glass is clean. Don't forget to use a contact guide strip. Process in proper developer using recommended procedure.
4. After the positive has dried, place it on a light table or viewer and discuss it with your instructor.

ANSWERS TO ASSIGNMENT SHEETS 1 AND 2 - MAKING A RIGHT READING POSITIVE FROM A CAMERA NEGATIVE MAKING A DUPLICATE POSITIVE WITH HIGH SPEED DUPLICATING FILM

The instructor should evaluate all assignment sheets on an individual basis according to criteria set in this unit.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: VIII-1 OR DEMONSTRATION:

EQUIPMENT, TOOLS, AND MATERIALS
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify the typical tools, supplies, and materials used by a stripper.
2. List three types of masking materials used by strippers.
3. Differentiate between transmission and reflection images.
4. Define
    a. Window
    b. Right reading
    c. Wrong reading
    d. Flat
    e. Positive
    f. Negative
5. Describe five characteristics of a good environment in which strippers work.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Tools for the Stripper
2. Video Tape GA-88-160: Film Image Assembly. Available from The Media Center, State Fair Community College, 1900 Clarendon Rd., Sedalia, MO 65301 (816)826-7100

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, chs. 10, 22.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles. A. Bennett, 1980, chs. 10, 13.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984, chs. 2-3.

INTRODUCTION:

As with any craft, the quality produced depends on the skill of the crafter and the availability of the proper tools, equipment and supplies. This lesson is intended to orient the student to the use of and the importance of quality tools, equipment and supplies.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII: PERFORMING FILM IMAGE ASSEMBLY

OUTLINE: (Key Points)

I. Stages of Image Assembly for Printing

A. Reflection images - prints of line work, lines, blobs, type, solids, etc. are assembled in positive, opaque, reflective composites and adhered to a paper board. These assembled composites are most often called paste-ups or mechanicals and the process of assembling these reflective images is most often called copy preparation. It is from these paste-ups that much of the film is produced. The more care, detail and planning that goes into this stage of image assembly (copy preparation), the less work and confusion the stripper (film assembly crafter) will be faced with. Positive, reflective images, for the most part, are easier to work with than film images. (See Unit IV for assembling reflective images - paste-up.)

B. Transmission images - images through which light may be transmitted may be called transmission images or simply "film images." The process of assembling these film images has traditionally been called "stripping," however this word no longer adequately describes the process. (Formerly, the stripper's job was to strip membrane emulsion images from glass plates and position them onto page size sheets of glass or "flats." The last vestige of this process was in the traditional letterpress newspaper industry and was performed by the photoengraver. Letterpress newspapers are today virtually extinct.) Today's process is primarily one of assembling images on films and is more accurately called "film image assembly" or simply just film assembly. Although the process today is called film assembly, the person who does the process is still most often called a "stripper." This term along with film assembler will be used in this unit.

II. Types of Film Assembly

A. Negative flat - film negatives assembled in position on a base of paper or plastic into which openings or windows are provided for the negatives. The base is such a color that it will hold back or block the transmission of actinic (image-forming) light. Only clear areas of negative film will transmit light and form image on plate.

1. Types of negatives assembled
    a. Line
    b. Halftone
    c. Hand-cut
    d. Marks (trim, center, guides, reference, etc.)
    e. Reverses
    f. Tints
2. Orientation of the film image
    a. Right reading - reads the same as the original when the negative is emulsion down
    b. Wrong reading - mirror image of the right reading original when the negative is emulsion (the side of the film coated with silver halide) down

B. Positive flat - film positives assembled on a clear base of plastic. When exposed to an image carrier the clear areas of the film positives transmit light and form the nonimage area. Most film positives are produced by contacting (See Unit VII) film negatives to another piece of photomechanical film. It is therefore appropriate to assume the same characteristics about film positives as negatives.

NOTE: Some image carriers (offset plates) react from film negatives to produce a positive image plate and some react from film positives to produce a negative image. It is the plate (image carrier) that is selected that dictates which kind of flat (positive or negative) the stripper will be working with. (See Unit X)

III. Planning and Imposition for Film Assembly

NOTE: Only in small offset printing shops is it the responsibility of the stripper to plan the layout and imposition of the flats upon which he/she will be working. In most cases he/she will be provided a dummy and layouts to follow for positioning the film images. Preparation of these layouts and dummys is covered in Unit I. (It is suggested that, if the teacher prefers, some of the information and activities of Unit I, lesson 2 can be used in this unit.)

A. Specifications for the stripper

    1. Press - all specifications to size, etc.
    2. Press sheets size
    3. Press imposition
    4. Number of pages - page size, number of signatures
    5. Bleeds
    6. Multiple images
    7. Gang runs - step and repeat
    8. Number of colors
    9. Bindery specifications
    10. Type plates

B. Whether all the planning has been done for the stripper or whether the stripper has to determine and react to all of the above variables, the fact remains that the responsibilities of the stripper are critical and mistakes made at this stage of the process will probably be very costly.

IV. Environment, Equipment, and Tools

A. Environment

    1. Spacious
    2. Clean
    3. Temperature and humidity controlled
    4. Distraction-free conditions
    5. Safe
    6. Well laid out
        a. Good work flow
        b. Adequate space for each operation
        c. Facilities convenient to other production stages
        d. Provide sufficient equipment
        e. Permit easy expansion

f. Include safety features for personnel and for film handling

7. Construction features

a. Floor - soft, resilient, easily cleaned

b. Lighting - shadowless, evenly distributed, zoned for individual control

c. Ventilation - temperature/humidity control, no drafts to blow dirt

d. Walls and ceilings - clean, light, bright, nonflaking paint

e. Plumbing - sink for cleaning brushes, hands, etc.

f. Noise Level - quiet, nondistracting

B. Equipment

1. Stripping table - light table

a. Strong - durable

b. Accurate - edges straight and square

c. Evenly illuminated

d. Tiltable (optional)

e. Larger than largest masking sheet

2. Layout (lineup) table

a. Accurate

b. Both horizontal and vertical ruling bars

c. Micrometer adjusted

3. Work table

a. One for each stripping table

b. Flat smooth surface

c. Flat shallow drawers

4. Filing cabinet (or other filing system)

a. Flat drawers the size of flats

        - b. Dust free
    - 5. Static eliminator - neutralize charge on films
    - 6. Contact frame (See Units VII and X)
        - a. As large as largest masking sheet
        - b. Point source light
        - c. High intensity ultraviolet light
        - d. Timer or integrator
        - e. Black or gray surroundings
    - 7. Register punch

C. Tools (HO 1)

- 1. Ruler (rule or scale) or line gauge (points or picas)
    - a. Accurate
    - b. Straight
    - c. Stainless steel
    - d. Etched or engraved and filled division marks
- 2. Straight-edge
    - a. Heavy steel
    - b. Straight
    - c. Beveled edge, machined and ground
- 3. T-square
    - a. Pinned head to blade
    - b. Square (90°)
    - c. Stainless
- 4. Triangle
    - a. 30°, 60° and 45° are desired
    - b. Large triangle 18" side
    - c. Stainless steel

5. Adjustable triangle
6. French curve - adjustable curve
7. Dividers
8. Compass
9. Ruling pen - technical pen
10. Pencils - 4H to 8H
11. Cutting implements
    a. Razor blades - preferred over knives by many strippers because they are inexpensive and can be disposed of when dull.

    CAUTION: Handle blades with extreme care--they can be dangerous.

    b. Disposable blade knife - such as x-acto or Olpha. Blade can be replaced. Some prefer x-acto type because round handle is more comfortable to use and easier to control. Some prefer Olpha type knife because segmented blade can be snapped off to ensure an "always sharp" blade.

    c. Scissors - lightweight with (at least) 10" long blades
12. Lithoneedles - used for marking and piercing film
13. Scribers - used for scribing (drawing) on film emulsions. Different styles produce different line weights.
14. Tweezers - used to remove small pieces of peelable masking film
15. Magnifier
16. Brush - used for opaquing
    a. High quality
    b. #00 to #6 (#2 or #3 most used)
    c. Red sable
17. Brush - used for dusting films
18. Screen angle indicator

        19. Screen ruling scale
        20. Tape dispenser(s)

V. Supplies and Materials

   A. Film - (See Units V and VII)
      1. Camera
      2. Contacting
      3. Room light contacting film
      4. Duplicating film

   B. Proofing materials (See Unit IX)
      1. Blueprint
      2. Brownprint
      3. Diazo
      4. Dylux™
      5. Photographic paper
      6. Color-key
      7. Transfer key
      8. Cromalin™
      9. Matchprint™
      10. Diffusion transfer
      11. Stabilization paper

   C. Masking materials
      1. Goldenrod paper
         a. Noncritical register jobs
         b. True goldenrod is yellow, but orange or red papers better block actinic light.
         c. Not dimensionally stable (affected by temperature and humidity)
         d. Less expensive than other materials

    e. Thickness varies - cause drawdown (vacuum) problems

    f. Should be coated on two sides

    g. Requires very careful cutting to provide sharp (not fuzzy) edges

  2. Vinyl

    a. Red or orange polyvinyl chloride

    b. Used for close register jobs

    c. Relatively dimensionally stable - not greatly affected by temperature and humidity

    d. Accumulated heat of exposure may reach vinyl softening point of 145°F.

    e. Register holes are easily distorted and require reinforcement.

  3. Clear film - acetate or polyester

    a. Acetate can be scored and cracked instead of cut, and is easier to work with.

    b. Polyester must be cut; danger of scratching light table surface exists.

    c. Acetate is not dimensionally stable; use it only for one color, noncritical register jobs.

    d. Polyester is dimensionally stable; it is good for critical register jobs.

  4. Preruled masking sheets - small press size

  5. Peelable masking film - ruby or amber

  6. Photographic masking film

D. Stripping supplies

  1. Tint sheets (screen tints)

  2. Red litho tape

  3. Rubber cement

  4. Opaque

    a. Red - easier to use

        b. Black - finer detail, used for scribing

    5. Cleaning solutions

        a. Film cleaner

        b. Glass cleaner

        c. Chlorine bleach

    6. Register tabs, buttons, and pins

    7. Register marks

        a. Trim marks

        b. Cross marks

        c. Center marks

        d. Side guide marks

        e. Collating marks

        f. Preprinted flat labels

    8. Quality control devices

        a. Alignment grids

        b. Circle center finder

        c. Contacting exposure controls

        d. Transparent gray scale

        e. Contacting targets

VI. Care of Tools and Equipment

A. Always handle tools carefully to avoid damaging them. Care must be taken when using the T-square and/or triangle as a cutting straight-edge so that they aren't nicked. Nicks and scrapes will cause irregularities in the line or cut quality the next time the tools are used as straight-edges.

B. Problems caused by dirty tools

1. They may transfer dirt to negatives thus causing clear areas to be blocked.

2. Wax, oil or grease may spot plates.

        a. Grease repels water.

        b. These will print as image.

    C. Care of the light table

        1. When cutting film, use scissors or place a clear piece of polyester film under the film to be cut. Do not cut directly on the light table. If you are using acetate base film, the film may be scored with a knife and broken or torn apart.

        2. It is desirable to clean light tables regularly as dirty spots may cause you to miss spots while opaquing

        3. Clean water-soluble dirt with glass cleaner and dry wipe or cheesecloth.

        4. Clean adhesive tape residue by scraping with razor blade.

        5. Clean table again with glass cleaner.

        6. Inspect.

VII. Summary and Conclusion

    A. Stages of image assembly for printing

    B. Types of film assembly

    C. Planning and imposition for film assembly

    D. Environment, equipment, and tools

    E. Supplies and materials

    F. Care of tools and equipment

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. Why is it important to work with clean, grease-free tools?
2. Name three tools the stripper might use for cutting film.
3. How does one clean the surface of a light table?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Demonstrate the proper use and care of tools and equipment used by a stripper.

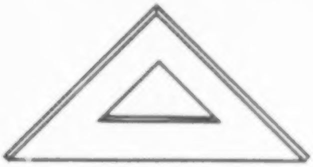
LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

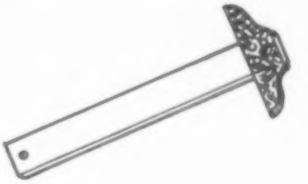
UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS:

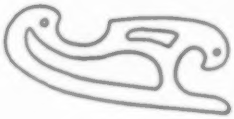
1. Write the proper name of the tool in each blank under the tool illustration.



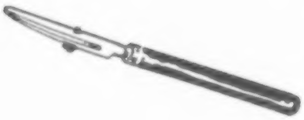
a. ____________________



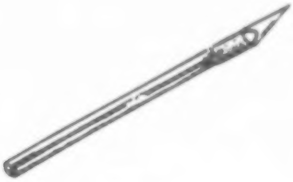
b. ____________________



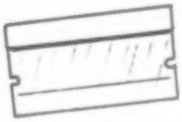
c. ____________________



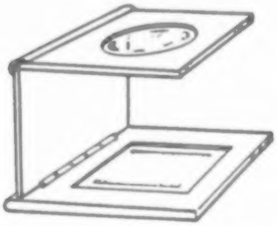
d. ____________________



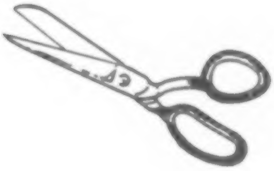
e. ____________________



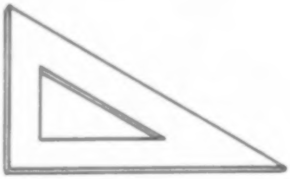
f. ____________________



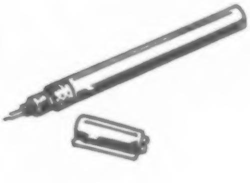
g. ____________________



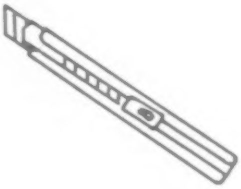
h. ____________________



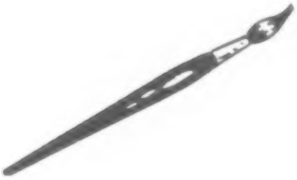
i. ____________________



j. ____________________



k. ____________________



l. ____________________

2. What might be the consequences of dirty tools or a dirty light table?

3. Why must you be careful when cutting along the edge of the T-square or triangle?

4. How can you avoid scratching the glass of the light table when cutting film?

5. What damage might be done to a T-square or triangle if dropped?

6. List three types of masking material.

   a.

   b.

   c.

7. What is the difference between transmission and reflection images? Which does the stripper work with?

8. Define the following terms:

   a. Window

   b. Right reading

   c. Wrong reading

   d. Flat

e. Positive

f. Negative

9. List five characteristics of a good environment for film assembly.

a.

b.

c.

d.

e.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

ANSWERS TO EVALUATION ITEMS:

1. Tool identification
    a. 45°/90° triangle
    b. T-square
    c. French curve
    d. Ruling pen
    e. Stripping knife
    f. Razor blade
    g. Magnifier or linen tester
    h. Scissors or shears
    i. 30°/60°/90° triangle
    j. Technical pen
    k. Stripping knife
    l. Opaquing brush

2. Dirty tools may transfer dirt and grease to the film which in turn may transfer to the plate. Greasy spots on the plate will become image area. Dirt spots on film may hold back light so that image is absent or weak in those areas. Dirty light tables, in addition to the above, may cause you to miss spots when opaquing.

3. Care must be taken when using the T-square and/or triangle as a cutting straight-edge so that they aren't nicked. Nicks and scrapes will cause irregularities in the line or cut quality the next time the tools are used as straight-edges.

4. When cutting film use scissors or place a clear piece of polyester film under the film to be cut. Do not cut directly on the light table. If you are using acetate base film, the film may be scored with a knife and broken or torn apart.

5. T-squares and triangles when dropped may be nicked which will render them useless as a straight edge. A T-square that has been dropped may also have a loose or out-of-square head.

6. The student may list any three of the following:

   a. Goldenrod paper
   b. Vinyl (red or orange)
   c. Clear film
   d. Preruled masking sheets
   e. Peelable masking film
   f. Photographic masking film

7. Transmission images are used by contacting or projecting light through film with clear and opaque areas. Reflection images reflect light through a lens to form an image. The stripper works with film or transmission images.

8. a. Window - an opening cut into masking material that allows light to be transmitted through that opening and the film positioned therein

   b. Right reading - when film reads from top-to-bottom, left-to-right and has the emulsion positioned down, it is said to be right reading

   c. Wrong reading - when the film image is backwards or mirror reading with the emulsion down it is said to be wrong reading

   d. Flat - an assemblage of film negatives position on a masking sheet is called a flat

   e. Positive - black image area with a clear or white nonimage area

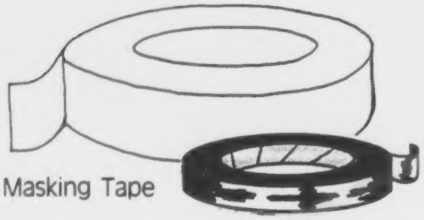
   f. Negative clear or white image area with black nonimage area

9. The student may list any five of the following:

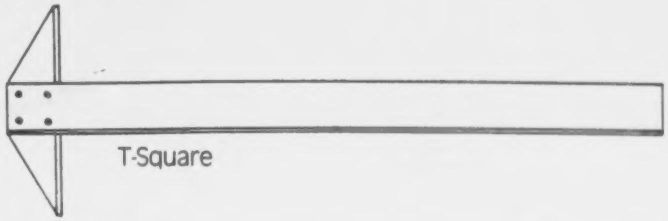
   a. Spacious
   b. Clean
   c. Temperature and humidity controlled
   d. Distraction-free
   e. Safe
   f. Well laid out
   g. Optimum construction features

HO 1

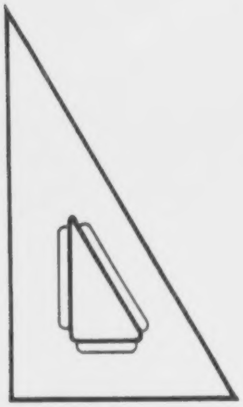
Tools for the Stripper

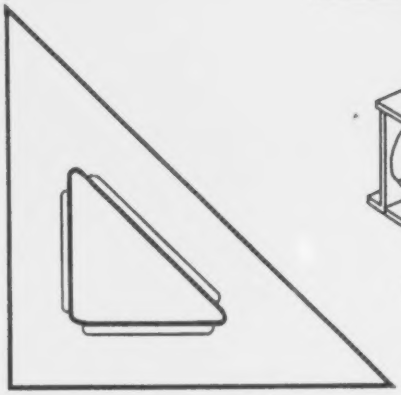

Masking Tape

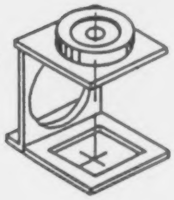
Opaque Litho Tape

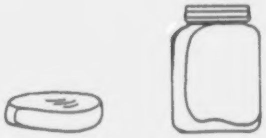

T-Square

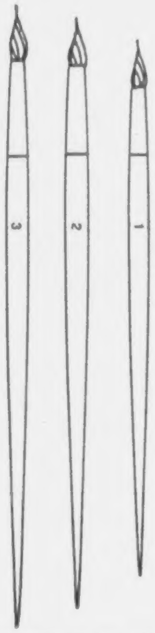
Etched Steel Rule

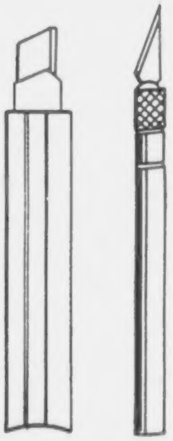

30º/60º Triangle

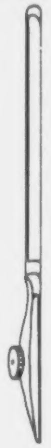

45º Triangle

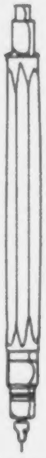

Magnifier

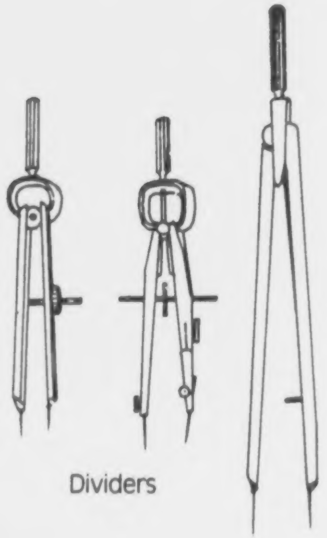

Cake or Liquid Opaque

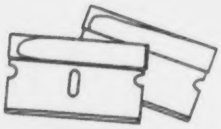

Opaquing Brushes

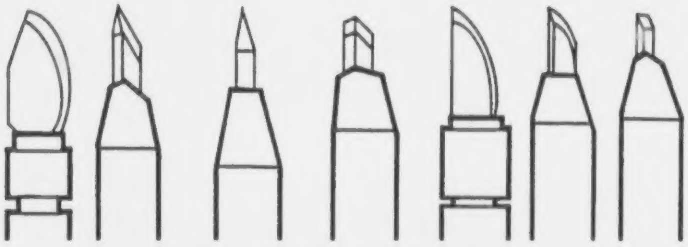

Cutting Knives


Ruling Pen


Technical Pen


Dividers


Razor Blades


Litho Needles and Scribers

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: OR DEMONSTRATION: VIII-2

CARE OF TOOLS AND EQUIPMENT
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Demonstrate proper use of tools and equipment according to the steps of procedure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. Light table
2. T-square
3. Triangle
4. Ruler
5. Litho and masking tape
6. Dividers
7. Pens
8. Brushes
9. Opaque

10. Magnifier
11. Knife or blade
12. Pencils and markers
13. Compass

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

INTRODUCTION:

Using the information from the previous lesson, we will examine ways to care for the tools used in film assembly.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII: PERFORMING FILM IMAGE ASSEMBLY

STEPS OF PROCEDURE:

1. Select T-square, triangle, straight-edge.
    a. Do not drop or nick.
    b. Keep clean so as not to transfer dirt to negatives.
    c. Do not cut into edge.
2. Select pens, scribes, knives, compass and dividers.
    a. Keep points sharp.
    b. Keep pens clean with caps on.
    c. Clean brushes after use and repoint.
    d. Do not cut along scale or rule.
3. Clean light table surface.
    a. Use glass cleaner to remove water soluble dirt.
    b. Use film cleaner or fast drying solvent to clean wax, grease or ink from surface.
    c. Scrape with razor blade any remaining residue such as adhesive from tape.
    d. With clean, dry wipe, reclean surface with glass cleaner.
4. Clean tools with soap and water. Dry thoroughly.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. Identify the care and use of tools used in film assembly.

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS: NAME OF STUDENT: ____________________

CARE OF TOOLS AND EQUIPMENT

EQUIPMENT:

1. Light table
2. T-square
3. Triangle
4. Ruler
5. Litho and masking tape
6. Dividers
7. Pens
8. Brushes
9. Opaque
10. Magnifier
11. Knife or blade
12. Pencils and markers
13. Compass

DID THE STUDENT:	YES	NO
1. Select T-square, triangle, straight edge. a. Do not drop or nick.		
b. Keep clean so as not to transfer dirt to negatives.		
c. Do not cut into edge.		
2. Select pens, scribes, knives, compass and dividers.		
a. Keep points sharp.		
b. Keep pens clean with caps on.		
c. Clean brushes after use and repoint.		
d. Do not cut along scale or rule.		

DID THE STUDENT:	YES	NO
3. Clean light table surface. a. Use glass cleaner to remove water soluble dirt.		
b. Use film cleaner or fast drying solvent to clean wax, grease or ink from surface.		
c. Scrape with razor blade any remaining residue such as adhesive from tape.		
d. With clean, dry wipe, reclean surface with glass cleaner.		
4. Clean tools with soap and water. Dry thoroughly.		

The student has satisfactorily completed the procedure "CARE OF TOOLS AND EQUIPMENT" according to the steps outlined.

Instructor's Signature
(Verifying Satisfactory Completion)

Date

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII: PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: OR DEMONSTRATION: VIII-3

SQUARING THE LIGHT TABLE
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Square the front edge of the light table with one of the two vertical edges according to the steps of procedure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: How to Square a Light Table
2. Large sheet of white paper
3. Masking tape
4. Light table
5. T-square
6. Pen or pencil
7. Light table adjustment tool such as a hex key wrench or screwdriver

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Peck, Harold L. Stripping: The assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

INTRODUCTION:

When two rails of the light table are perpendicular (square, 90°) to each other, the stripper can use the T-square from either edge. This provides flexibility to draw, scribe, or cut longer lines than with a triangle. Using the information presented in the previous lessons, we will now square a light table. Remember to practice proper use of the tools.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

NOTE: Most strippers, in order to assure themselves of perpendicularity, will use the T-square from the left or right edge, and use a triangle for the vertical. Even though the student may not need the bottom edge of the table, it should be square with the side. (HO 1)

STEPS OF PROCEDURE:

1. Using masking tape, securely attach a large, blank sheet of lightweight white paper to the light table.

2. Draw a horizontal centerline on the paper with a T-square. Be sure T-square head is tight against the left side (right for left-handers) of the light table.

3. Draw a vertical centerline that bisects the horizontal centerline using the T-square head against the front edge of the light table.

4. Remove the tape and flop the sheet from front to back.

5. Realign the paper using the horizontal centerline and T-square. Reattach paper to light table surface.

6. Draw a vertical line through the original point of intersection of the lines on the other side of the paper. (You will probably need to turn on the light table light to view this point).

7. Measure the distance between the ends of the two vertical lines at both top and bottom. Mark the halfway points between the lines.

8. Align the T-square on these two halfway marks and adjust the front rail of the light table until the T-square head makes uniform contact with the rail. Tighten the table rail.

   NOTE: Glass of table must be tight. Even though the paper (or negative) is taped securely to the glass, if the glass moves, the relationship from the edge of the light table (T-square) to the work will be changed.

   NOTE TO THE INSTRUCTOR: This lesson should be used also to emphasize the importance of keeping the T-square head tightly against the rail. Point out to the student how the blade of the T-square flexes when too much pressure is placed against it. This is a good opportunity for them to draw a number of lines against the T-square blade to get used to using the tools.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. What does it mean if a light table is square?
2. What is the importance of a square light table?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS: NAME OF STUDENT: ____________________

SQUARING THE LIGHT TABLE

EQUIPMENT:

1. Large sheet of white paper
2. Masking tape
3. Light table
4. T-square
5. Pen or pencil
6. Light table adjustment tool (hex, key wrench or screwdriver)

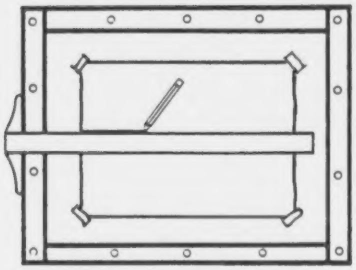
DID THE STUDENT:	YES	NO
1. Using masking tape, securely attach a large, blank sheet of lightweight white paper to the light table.		
2. Draw a horizontal centerline on the paper with a T-square.		
3. Draw a vertical centerline that bisects the horizontal centerline using the T-square head against the front edge of the light table.		
4. Remove the tape and flop the sheet from front to back.		
5. Realign the paper using the horizontal centerline and T-square. Reattach paper to light table surface.		
6. Draw a vertical line through the original point of intersection of the lines on the other side of the paper.		
7. Measure the distance between the ends of the two vertical lines at both top and bottom. Mark the halfway points between the lines.		

The student has satisfactorily completed the procedure "SQUARING THE LIGHT TABLE" according to the steps outlined.

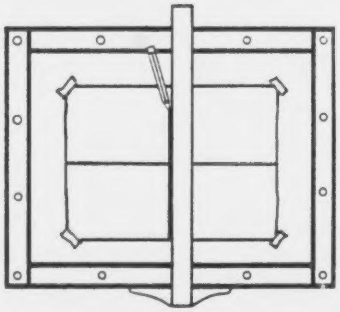
Instructor's Signature
(Verifying Satisfactory Completion)

Date

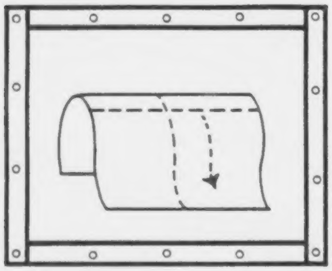
How to Square a Light Table



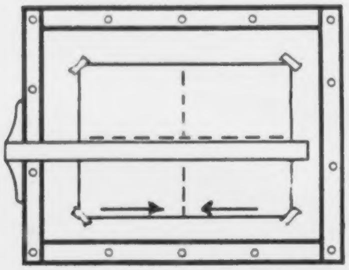
Secure a large sheet of blank paper to the light table. Draw a horizontal centerline with the T-square.



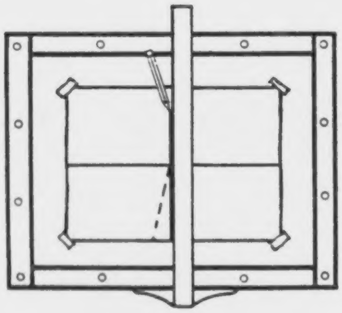
Draw a vertical centerline that bisects the horizontal centerline.



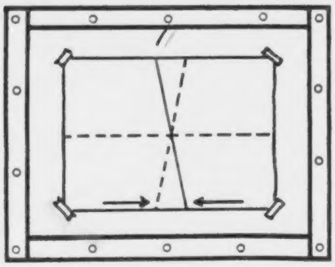
Flop the sheet, front to back, top to bottom.



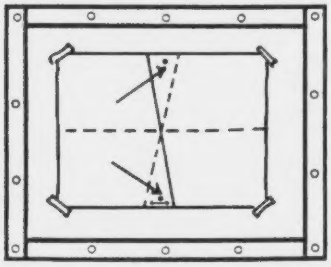
Use the T-square to realign the paper by the horizontal centerline. Secure the sheet to light table again.



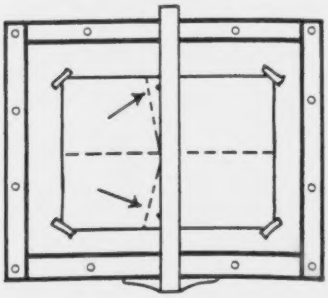
Draw a vertical line through the original point of intersection.



Measure the distance between the ends at the two vertical lines. Mark the halfway point between the lines.



Adjust front edge of stripping table so that T-square blade connects the two points.



Tighten front edge of table. Left edge and front edge are now square (90°) with each other. This process should be repeated on other two edges so they will be squared for left-handed users.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: OR DEMONSTRATION: VIII-4

MAKING THE STRIPPING LAYOUT
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Plan the position of all negatives and draw layout according to the steps of procedure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Making the Layout
2. HO 2: Plate Bend and Gripper Allowance
3. Large sheet of paper or masking material
4. T-square
5. Triangle
6. Pencil
7. Ball-point pen
8. Ruler
9. Stripping knife
10. Drafting tape

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 10.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles. A. Bennett, 1980, ch. 13.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundations, 1984, chs.4, 5, 7, 8.

INTRODUCTION:

Ninety percent of success in film image assembly is proper planning and care in the positioning of the film components. This lesson concentrates on these skills.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

STEPS OF PROCEDURE:

1. Clean light table.

2. Select sheet of paper (white or goldenrod) slightly larger than the size of the press plate. (HO 1)

3. Square sheet on light table with T-square and gripper edge of sheet. Secure to light table with masking or drafting tape. If punch/pin register system is to be used, punch or tab sheet and place over pins on pin bar attached to table.

4. Rule out important reference marks. Measure accurately. Use pencil to measure position and make lines with fine ball point. (HO 2)

   a. Plate bend margin

   b. Gripper margin

   c. Maximum sheet size (printing limits)

   d. If web press, show plate bend at plate tail, no gripper margin

   e. Sheet vertical centerline (perpendicular to gripper)

   f. Sheet horizontal centerline (parallel to gripper)

   g. Sheet width lines centered on vertical center

   h. Image area width centered on sheet size

5. If negatives are to be stripped to masking from the back using page or unit centermarks, rule the centers of each page or unit. Draw trim marks and retrim marks.

6. If negatives are to be stripped from the front using "finger holes" and the negatives have no reference marks, measure and rule out page or unit margins, image outlines, type limits, etc. Draw trim marks and retrim marks.

7. Measure and rule out any other reference lines needed.

   a. Fold marks

   b. Die cutting marks

c. Other binding marks such as scoring, perforating, embossing, etc.

8. Measuring from paste-up or artist's layout, measure and draw out any insert locations not indicated on film.

   a. Halftones

   b. Reverses

   c. Tints

   d. Overprints

   e. If inserts are close to each other or overlapping, it may be necessary to plan these for complimentary flats when assembling the film.

9. Notch plate positioning lines. If a pin register system is being used, it may not be necessary to use notches.

NOTE TO THE INSTRUCTOR: Refer to HO 1 for additional details for making layout. Also see Unit I for planning a job.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. Discuss the procedure for preparing negatives for a layout.
2. What reference marks are important in a layout and how are they determined?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS: NAME OF STUDENT:____________________

MAKING THE STRIPPING LAYOUT

EQUIPMENT:

1. Large sheet of paper or masking material
2. T-square
3. Triangle
4. Pencil
5. Ball-point pen
6. Ruler
7. Stripping knife
8. Drafting tape

DID THE STUDENT:	YES	NO
1. Clean light table.		
2. Select sheet of paper (white or goldenrod) slightly larger than the size of the press plate.		
3. Square sheet on light table with T-square and gripper edge of sheet. Secure to light table with masking or drafting tape. If punch/pin register system is to be used, punch or tab sheet and place over pins or pin bar attached to table.		
4. Rule out important reference marks. Measure accurately. Use pencil to measure position and make lines with fine ball point a. Plate bend margin		
b. Gripper margin		
c. Maximum sheet size (printing limits)		
d. If web press, show plate bend at plate tail, no gripper margin		

DID THE STUDENT:	YES	NO
e. Sheet vertical centerline (perpendicular to gripper)		
f. Sheet horizontal centerline (parallel to gripper)		
g. Sheet width lines centered on vertical center		
h. Image area width centered on sheet size		
5. If negatives are to be stripped to masking from the back using page or unit centermarks, rule the centers of each page or unit. Draw trim marks and retrim marks.		
6. If negatives are to be stripped from the front using "finger holes" and the negatives have no reference marks, measure and rule out page or unit margins, image outlines, type limits, etc. Draw trim marks and retrim marks.		
7. Measure and rule out any other reference lines needed. a. Fold marks		
b. Die cutting marks		
c. Other binding marks such as scoring, perforating, embossing, etc.		
8. Measuring from paste-up or artist's layout, measure and draw out any insert locations not indicated on film. a. Halftones		
b. Reverses		
c. Tints		
d. Overprints		
9. Notch plate positioning lines.		

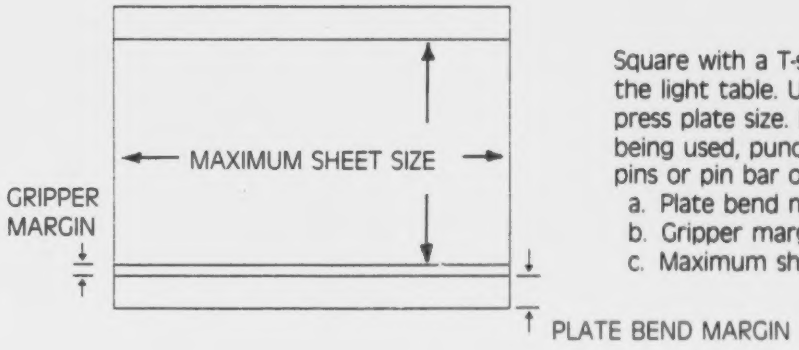
The student has satisfactorily completed the procedure "MAKING THE STRIPPING LAYOUT" according to the steps outlined.

____
Instructor's Signature
(Verifying Satisfactory Completion)

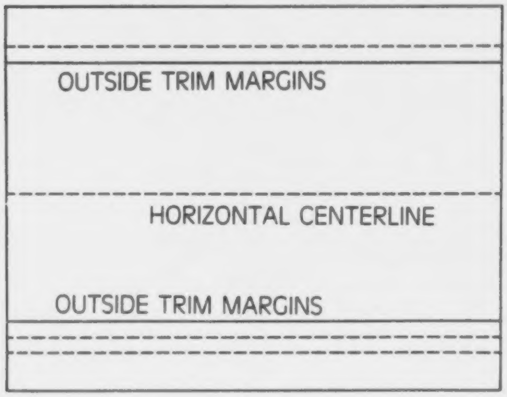
____
Date

HO 1

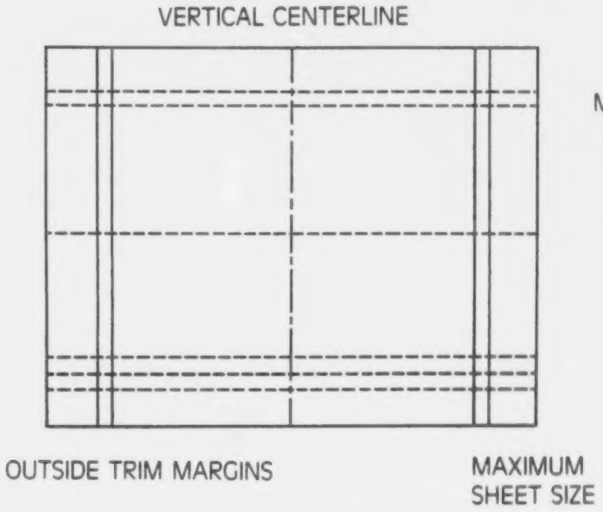
Making the Layout


MAXIMUM SHEET SIZE
GRIPPER MARGIN
PLATE BEND MARGIN

Square with a T-square and tape masking paper to the light table. Use paper slightly larger than the press plate size. If punch pin register system is being used, punch the masking sheet and place on pins or pin bar on light table. Measure and rule:
- a. Plate bend margin
- b. Gripper margin
- c. Maximum sheet size

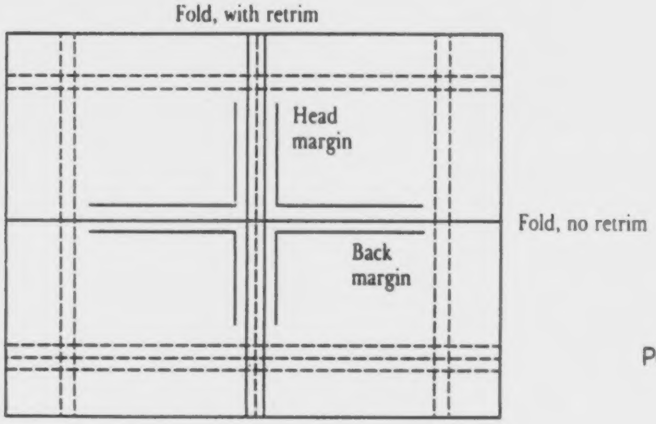

OUTSIDE TRIM MARGINS
HORIZONTAL CENTERLINE
OUTSIDE TRIM MARGINS

Measure and draw:
- a. Horizontal centerline
- b. Outside trim margins

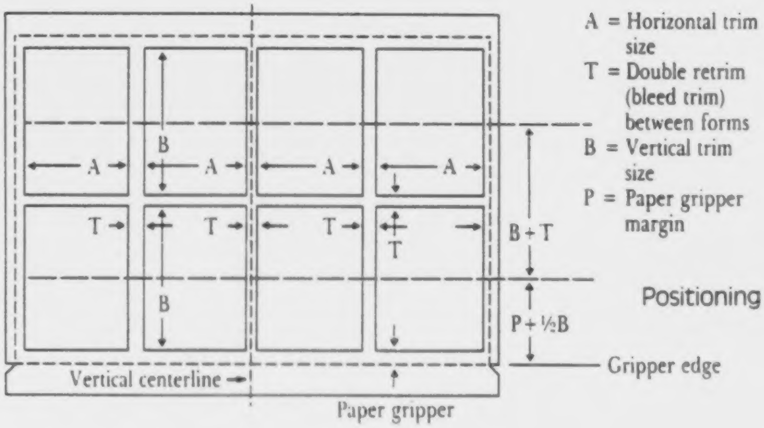

VERTICAL CENTERLINE
OUTSIDE TRIM MARGINS
MAXIMUM SHEET SIZE

Measure and draw:
- a. Vertical centerline
- b. Width of press sheet centered on vertical centerline
- c. Outside trim margins or image area

Measure and rule out other reference lines as needed. If film is to be stripped by centerlines, centerlines for each page will be needed. If no centerlines are available, page or type limits must be positioned on layout. See the following samples.

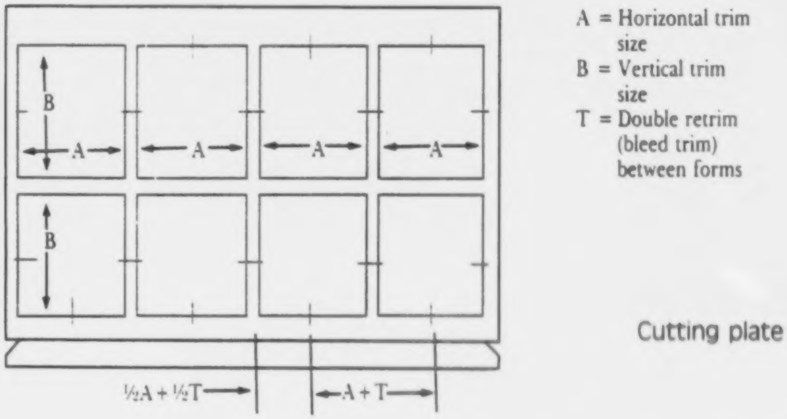

Fold, with retrim
Head margin
Fold, no retrim
Back margin

Positioning from margins of type


B
A
T
B + T
P + ½B
Gripper edge
Vertical centerline
Paper gripper

A = Horizontal trim size
T = Double retrim (bleed trim) between forms
B = Vertical trim size
P = Paper gripper margin

Positioning with centerlines



A = Horizontal trim size
B = Vertical trim size
T = Double retrim (bleed trim) between forms

Cutting plate positioning notches on flat or layout

Plate Bend and Gripper Allowance

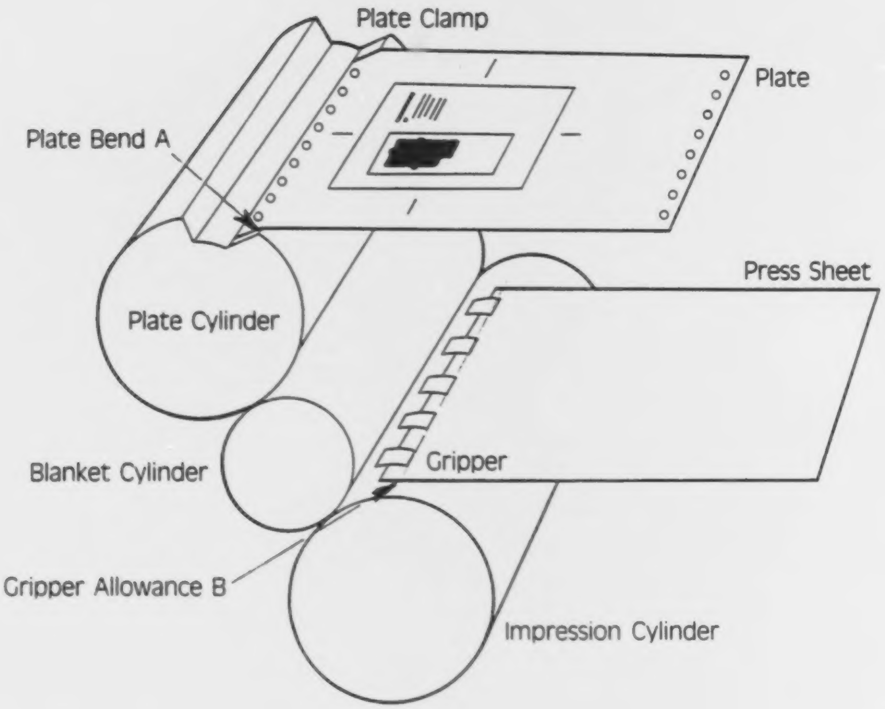
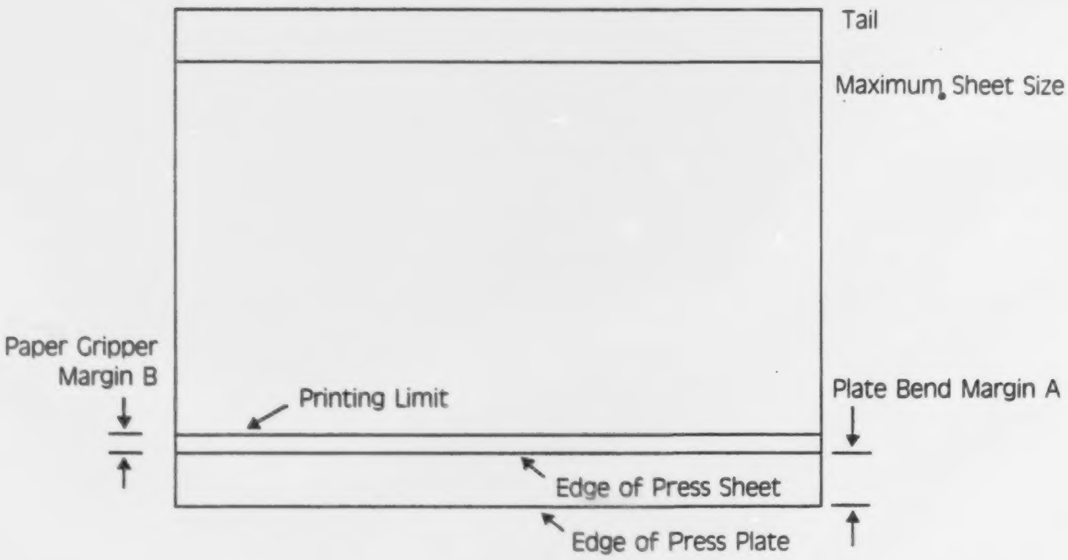


Plate Clamp
Plate
Plate Bend A
Press Sheet
Plate Cylinder
Gripper
Blanket Cylinder
Gripper Allowance B
Impression Cylinder


Tail
Maximum Sheet Size
Paper Gripper Margin B
Printing Limit
Plate Bend Margin A
Edge of Press Sheet
Edge of Press Plate

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: OR DEMONSTRATION: VIII-5

OPAQUING NEGATIVES
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Opaque camera negatives according to the steps of procedure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Opaquing
2. Camera negative
3. Red and/or black cake opaque
4. Red and/or black liquid opaque
5. Brush
6. Ammonia water (optional)
7. Light table
8. Overhead light
9. Knife
10. Cotton swabs

INFORMATIONAL ASSIGNMENT: (Student)

Admas, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

INTRODUCTION:

The quality of the product and the speed of production will be greatly affected by the opaquing technique. This lesson highlights some proper opaquing methods that should be practiced.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

STEPS OF PROCEDURE:

1. Select any camera negatives to opaque. (HO 1)

   NOTE: Show difference between red and black opaque and liquid and cake opaque.

2. Mix opaque. One brush stroke should cover negative blemishes in one coat. Opaque should dry in approximately 30 seconds. Some opaquers use ammonia water to mix with opaque to speed drying. Opaque should not run.

3. Select brush of appropriate size with adequate point.

4. Opaque with brush strokes when possible; do not dab. Do not attempt to opaque with a dry or nearly dry brush.

5. Opaque from left to right and from top to bottom.

6. When opaquing is dry, inspect all negatives both on a light table and with surface light.

7. Clean brush in clear water. Point wet brush with thumb and forefinger. Dry brush with point up.

8. Practice cleaning techniques. Cover opaque; clean any opaque from light table and hands.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII: PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. What is opaque; when and how is it used?
2. What tools are needed to apply opaque?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS: NAME OF STUDENT: ____________________

OPAQUING NEGATIVES

EQUIPMENT:

1. Camera negative
2. Red and/or black cake opaque
3. Red and/or black liquid opaque
4. Brush
5. Ammonia water (optional)
6. Light table
7. Overhead light
8. Knife
9. Cotton swabs

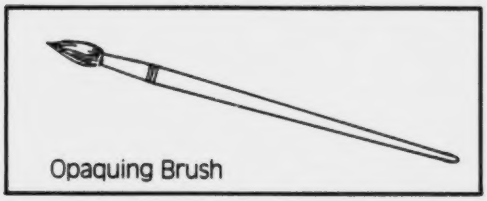
DID THE STUDENT:	YES	NO
1. Select any camera negatives to opaque.		
2. Mix opaque.		
3. Select brush of appropriate size with adequate point.		
4. Opaque with brush strokes.		
6. When opaquing is dry, inspect all negatives both on a light table and with surface light.		
7. Clean brush in clear water. Point wet brush with thumb and forefinger. Allow brush to dry with point up.		
8. Practice cleaning techniques. Cover opaque; clean any opaque from light table and hands.		

The student has satisfactorily completed the procedure "OPAQUING NEGATIVES" according to the steps outlined.

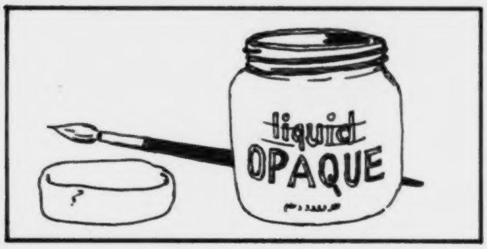
Instructor's Signature
(Verifying Satisfactory Completion)

Date

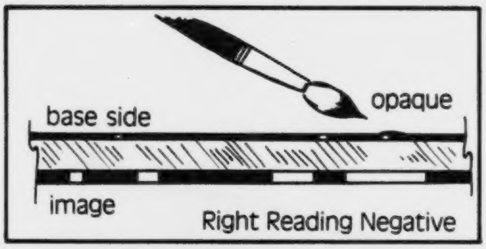
Opaquing


Opaquing Brush

Always clean the brush with water after each use. While brush is wet, draw the bristles to a point with thumb and forefinger and allow to dry in point-up position.

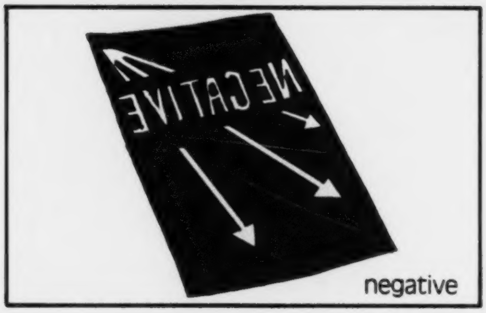

liquid
OPAQUE

Use red or black opaque in cake or liquid form. Stir and mix so that pin holes and blemishes in film are covered in a single stroke. Opaque should dry almost immediately.

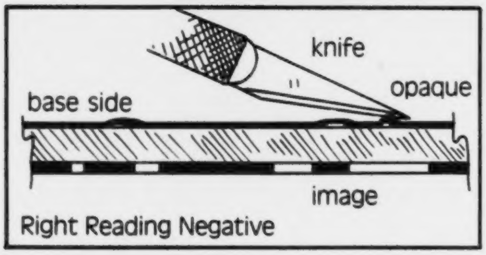

base side
opaque
image
Right Reading Negative

Select a brush that is large enough to hold a good charge of opaque, but with a tip small enough for detail work.

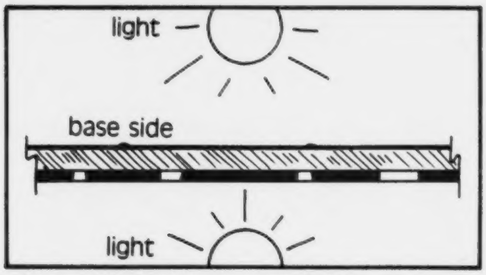
Opaque on the base side of the film (unless it is to be contacted).


NEGATIVE
negative

If you are right-handed, start opaquing in upper left corner and work toward the right and downward so that your hand doesn't drag through the wet opaque. Left-handed persons should work from upper right to lower left corner.


knife
opaque
base side
image
Right Reading Negative

Scrape away excess opaque with a knife. Do not scrape opaque if you are working on the emulsion side of the film. Wash opaque from the emulsion side with a wet cotton swab.


light
base side
light

Inspect from Above and Below

Use a light table for opaquing in order to see any defects in the negative. Inspect your opaquing with a light from above also. This will show smears and excess opaque that was not visible from below.

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: OR DEMONSTRATION: VIII-6

ATTACHING NEGATIVES TO MASKING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Properly position negatives in masking according to the layout and according to the steps of procedure.
2. Properly secure the negatives with tape according to the steps of procedure.
3. Inspect and correct deficiencies in the stripping according to the steps of procedure.
4. Correctly label the flats according to the steps of procedure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. Layout from lesson 4 of this unit
2. Negatives opaqued in lesson 5 of this unit
3. Knife
4. Scissors
5. Flat (masking sheet)
6. Ruled masking sheet

7. Masking tape
8. Red lithographer's tape
9. Black blank film
10. Stripping table

INFORMATIONAL ASSIGNMENT: (Student)

Admas, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

INTRODUCTION:

Accuracy, neatness, and proper procedure are emphasized in this lesson.

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

NOTE TO INSTRUCTOR: Emphasize procedure and accuracy. Check student work for straightness, overlapping negatives, excessive tape, cutting through negatives when opening masks, and opaquing quality.

STEPS OF PROCEDURE:

1. Using the layout developed in lesson 4 of this unit and the film opaqued in lesson 5, position and attach the negatives to masking.

2. Trim negatives to size slightly less than the space they will occupy to prevent film from overlapping.

   NOTE: Overlapping thicknesses may cause poor contact in the exposure frame which will cause a diffused image. When trimming negatives, leave a small portion of the trim marks and center marks.

3. There are two methods of attaching film to masking sheet. Either may be used.

   a. Cut finger holes in flat (masking sheet) for each negative. With layout drawn on masking sheet or using preprinted masking sheet, slip negatives under masking with emulsion down. (Right reading mask with right reading negatives under it.) Negative is then worked into position through finger hole, aligning reference marks with comparable marks on the flat. Tape negatives across the finger holes with masking tape. After all negatives on this flat have been positioned and temporarily taped, carefully flop the flat over (wrong reading) and securely tape negatives with short pieces of red lithographer's tape. Turn flat over, cut open mask covering image areas and remove mask and masking tape. You may use the alternate, preferred method, as follows.

   b. Ruled masking sheet is placed wrong reading (flopped) on the stripping table and a blank masking sheet is positioned over the flopped layout. If pin register is to be used, place both on pin bar. Negatives are then positioned emulsion up (wrong reading), aligning the reference marks on the negatives with corresponding lines on the layout. Negatives are then taped securely with short pieces of red litho tape. If negatives are still overlapping when positioned, tape one edge of positioned negative with masking tape, trim other three edges and tape; remove masking tape and trim and retape this edge with red tape. This method allows the reference marks to be used for positioning, but permits the negatives to be trimmed when too large and overlapping. Negative trimming should be done with scissors or, if knife is used, place waste film beneath film to cut against and protect masking. Flop flat back to right reading and cut away masking covering image areas.

4. After one of the above methods has been used for locating and attaching the negatives to the masking sheet, new trim marks, center marks and other reference marks are then scribed on small pieces of blank (black) film and positioned on the flat. These will be attached to the flat and aligned with the corresponding marks on the masking sheet or the layout. Be sure they are positioned where they will be removed when the press sheet is trimmed off. Commercial marks on film (positive or negative) are available.

5. Check flat for additional opaquing or retouching that may be necessary.

6. Label the flats; form designation, number of burns (exposures) or complementary flats. If transmission gray scale (plate guide) is to be used in making the plate, cut a window for it outside the work.

NOTE: This demonstration is intended for knowledgeable students. If the instructor wishes to first work with small duplicator size, preprinted masks and simple one page flats, the demonstration described here could follow.

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. Discuss the two methods of attaching film to masking sheet. Which method is preferred?
2. What causes a diffused image and how can this problem be avoided?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS: NAME OF STUDENT: ____________________

ATTACHING NEGATIVES TO MASKING

EQUIPMENT:

1. Layout from lesson 4 of this unit
2. Negative opaqued in lesson 5 of this unit
3. Knife
4. Scissors
5. Flat (masking sheet)
6. Ruled masking sheet
7. Masking tape
8. Red lithographer's tape
9. Black blank film
10. Stripping table

DID THE STUDENT:	YES	NO
1. Position and attach negatives to masking.		
2. Trim negatives to appropriate size.		
3. Attach film to masking sheet - Method 1 a. Cut finger holes in flat (masking sheet) for each negative.		
b. Slip negatives under masking with emulsion down and work into aligned position.		
c. Tape negatives across finger holes.		
d. After all negatives are positioned and taped, flop flat over and tape negatives securely with litho tape.		
e. Turn flat over, cut open mask covering image areas, and remove mask and masking tape.		

DID THE STUDENT:	YES	NO
4. Attach film to masking sheet - Method 2 a. Place ruled masking sheet wrong reading (flopped) on stripping table or position a blank masking sheet over the flopped layout; place both on pin bar, if applicable.		
b. Position negatives emulsion up and align reference marks on negatives and layout.		
c. Tape negatives securely with litho tape.		
d. Trim overlapping negatives.		
e. Flop flat to right reading and remove mask.		
5. Scribe reference marks on blank film and position on flat.		
6. Check flat for additional opaquing or retouching that may be necessary.		
7. Label flat.		
8. Cut window for gray scale if one is to be used.		

The student has satisfactorily completed the procedure "ATTACHING NEGATIVES TO MASKING" according to the steps outlined.

Instructor's Signature
(Verifying Satisfactory Completion)

Date

LESSON PLAN: 7

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: OR DEMONSTRATION: VIII-7

SCRIBING LINES
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Accurately scribe the lines for a simple form according to the steps of procedure.
2. Demonstrate proper emulsion-side opaquing according to the steps of procedure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. Instructor-supplied layout and specifications
2. Line negative or black, blank film for scribing
3. Opaque brush
4. Commercial scriber
5. T-square
6. Triangle
7. Straight-edge
8. Ruler or scale

9. Scribing tools
    a. Dividers
    b. Soft pencil
10. Drafting tape
11. Opaque (black)
12. Red litho tape
13. Cotton swabs

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. *Printing Technology*. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Spence, Wm. P. and David G. Vequist. *Graphic Reproduction*. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Peck, Harold L. *Stripping: The Assembly of Film Images*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

INTRODUCTION:

Skill in scribing on film is becoming less important as electronic imaging and copy prep methods become more popular. Scribed lines on negatives still can produce the sharpest and clearest lines and scribing remains a good method to produce forms.

LESSON PLAN: 7

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

NOTE TO INSTRUCTOR: Do not attempt to teach scribing using knife blades, pins, nails, etc. Good commercial scribers actually remove a thin strip of emulsion, not simply scratch it.

STEPS OF PROCEDURE:

1. Prepare light table and tools or line-up table by cleaning thoroughly. (Line-up table is more accurate.)

2. Fasten negative to be scribed emulsion up on light table. Square with T-square.

   NOTE: Acetate base film or commercial scribing film is best for scribing. Polyester or plastic base film is extremely difficult to scribe with quality lines.

3. Opaque all pin holes, scratches, and other blemishes on negative or film before scribing.

   NOTE: Opaque must be on emulsion side. Black opaque works best for scribing.

4. Transfer measurements from the layout, measuring accurately. If the layout is a previously printed piece or is accurately drawn, it may be positioned along side the negative to be scribed and then lines transferred by simply aligning the T-square blade on the sample or layout.

   NOTE: Small dividers may be used to assist in constructing evenly spaced lines.

5. Draw lines, when necessary, on the negative with soft pencil. Be careful not to scratch emulsion. Use "tick marks" or draw the limit of the lines. Tick marks or guide marks are often put on the paste-up outside the limits of the job.

6. Using a hand scriber, scribe lines holding the handle vertical to the face edge of straight edge scribing all horizontal lines first. Select scriber with blade width required for line thickness.

NOTE: To check quality of scribers first practice on scrap film. Some films scribe better if the area of emulsion to be scribed is first dampened with water.

7. If bolder lines are required, select a scriber with wider blade width, or hold scriber at a slight angle and rescribe to overlap the first line.

8. Scribed lines should extend slightly beyond their end limits. Red litho tape may be used on the base side of the film to cover up any overscribe.

9. Do not lift the T-square until you are sure the line is transparent and does not need rescribing.

10. Dotted or dashed lines are best made by scribing a solid line and interrupting it with a positive grid film placed over this line on the base side.

11. If desired, the negative may be rotated 90° after the horizontal lines have been scribed so that the vertical lines can be scribed in a horizontal position. Some crafters prefer to scribe in this manner.

12. Opaque out any errors on emulsion side. Rescribe through opaque if necessary. Removal of opaque on emulsion side of film requires washing with a wet cotton swab.

NOTE: Attempting to scrape off opaque will damage surrounding emulsion.

13. After scribing is completed, the negative may be turned over. Any remaining faults, blemishes or overscribes may be repaired with opaque and/or red litho tape.

14. Negative may now be assembled as any other negative.

LESSON PLAN: 7

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. Why is scribing lines on film becoming less important?
2. What advantage does scribing lines on negatives have over other methods of producing lines?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 7

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS: NAME OF STUDENT: ____________________

SCRIBING LINES

EQUIPMENT:

1. Instructor-supplied layout and specifications
2. Line negative or black, blank film for scribing
3. Opaque brush
4. Commercial scriber
5. T-square
6. Triangle
7. Straight edge
8. Ruler or scale
9. Scribing tools
   a. Dividers
   b. Soft pencil
10. Drafting tape
11. Opaque (black)
12. Red litho tape
13. Cotton swabs

DID THE STUDENT:	YES	NO
1. Prepare light table and tools (or line-up table).		
2. Fasten line negative emulsion up on light table; square with T-square.		
3. Opaque all pin holes, scratches, and other blemishes on emulsion side.		
4. Accurately transfer layout measurements to the film.		
5. Test line quality of scriber on scrap film.		
6. Scribe all lines on the film (horizontal lines first).		
7. Opaque errors on emulsion side and rescribe.		
8. Turn negative over and repair any other faults.		

The student has satisfactorily completed the procedure "SCRIBING LINES" according to the steps outlined.

____
Instructor's Signature
(Verifying Satisfactory Completion)

____
Date

628

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: OR DEMONSTRATION: VIII-8

ASSEMBLING FILM (NEGATIVES AND POSITIVES) TO CLEAR POLYESTER
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Attach negatives to clear polyester according to the steps of procedure.
2. Assemble positives for positive plates according to the steps of procedure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. White sheet for layout
2. Clear polyester
3. T-square
4. Masking tape
5. Red litho tape
6. Masking film
7. Negatives
8. Positives
9. Opaque
10. Brush
11. Knife or blade
12. Scissors
13. Red litho tape
14. Clear cell

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

INTRODUCTION:

Although the student may not be ready to work with stripping film to clear base material, this technique should at least be discussed and demonstrated. Most large printing companies, particularly publication printers, assemble all of their work in this manner.

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII: PERFORMING FILM IMAGE ASSEMBLY

STEPS OF PROCEDURE: Demonstration 8A

Procedure for Attaching Negatives to Clear Polyester

NOTE: Attaching negatives to clear polyester permits the use of stronger, dimensionally stable base film. Since no holes or windows are cut in the base, it remains strong and intact when exposing through it to a plate. It is more difficult to keep clean when dirt gets between the negatives and the clear base.

1. Rule layout on white sheet.
2. Position clear polyester over layout with gripper edges aligned. Both are squared to light table and positioned wrong reading.
3. Position negatives emulsion up on the clear cell by aligning negative's register marks to the layout lines. Tape down negatives.
4. ALTERNATIVE METHOD: Use peelable masking film.
    a. Position peelable masking material over layout, peelable side down.
    b. Position and tape negatives as before.
    c. Scribe and attach marks.
5. Cut mask(s).
    a. If negatives are adhered to clear cells, masking sheet is positioned over right reading flat and windows are opened. This method is advantageous when a number of flats are of the same format such as in a book job. Opened windows in the mask will be the same for all clear base flats.
    b. If negatives are adhered to peelable masking film, flop flats membrane side up and cut and peel to form windows for image area.

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII: PERFORMING FILM IMAGE ASSEMBLY

STEPS OF PROCEDURE: Demonstration 8B

Procedure for Assembling Positives for Positive Plates

NOTE: Assembling positives for positive plates is not as common as it once was, but should be demonstrated, even if the students do not do it in the lab. Positives must be kept very clean.

1. Inspect positives and retouch any voids in image areas with opaque. Carefully scrape away emulsion in nonimage areas.
2. Position layout wrong reading on stripping table. Position clear cell over the layout.
3. Trim positives to size smaller than the area they are to occupy. Do not remove reference marks.
4. Position positives, emulsion up (wrong reading) on cell and tape down with short pieces of red litho tape. Positives should be securely fastened, but do not use excessive red tape.
5. Trim away film reference marks after positives are fastened. Attach new positive reference marks for the flat, aligning them with corresponding marks on layout.
6. With deep etch and other whirler-coated plates, the image left by red tape and film edges is staged out on the plate. When using presensitized plates, a knockout mask should be made.
7. Make a knockout mask for a second exposure complementary to the flat just stripped. The knockout or burnout mask will have masking covering all image areas and marks. The rest of this flat will be clear. When this image-protecting mask is exposed to the plate, all tape marks and other undesirable marks will be burned out.

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. What are the advantages of attaching negatives to a clear polyester?

2. How is a positive prepared for plate assembly?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS: NAME OF STUDENT:____________________

ASSEMBLING FILM (NEGATIVES AND POSITIVES) TO CLEAR POLYESTER

EQUIPMENT:

1. White sheet for layout
2. Clear polyester
3. T-square
4. Masking tape
5. Red litho tape
6. Masking film
7. Negatives
8. Positives
9. Opaque
10. Brush
11. Knife or blade
12. Scissors
13. Red litho tape
14. Clear cell

DID THE STUDENT:	YES	NO
Attach Negatives to Clear Polyester 1. Rule layout on white sheet.		
2. Position clear polyester over layout with gripper edges.		
3. Position negatives on clear cell and tape down.		
4. ALTERNATIVE METHOD: Use peelable masking film. a. Position peelable masking material over layout, peelable side down.		
b. Position and tape negatives as before.		
c. Scribe and attach reference marks.		

DID THE STUDENT:	YES	NO
5. Cut mask(s). a. Negatives adhered to clear cells - position masking sheet over right reading flat; open windows.		
b. Negatives adhered to peelable masking film - flop flats membrane side up; cut and peel to form windows.		
Assemble Positives for Positive Plates 1. Inspect positives and retouch any voids in image areas with opaque; scrape away emulsion from nonimage areas.		
2. Position layout wrong reading on stripping table. Position clear cell over the layout.		
3. Trim positives to size smaller than the area they are to occupy.		
4. Position positives, emulsion up (wrong reading) on cell and tape down with litho tape.		
5. Trim away film reference marks; attach positive reference marks on flat (aligned with marks on layout).		
6. Make knockout mask for presensitized plate.		
7. Make knockout mask for a second complementary exposure to the flat just stripped.		

The student has satisfactorily completed the procedure "ASSEMBLING FILM (NEGATIVES AND POSITIVES) TO CLEAR FILM" according to the steps outlined.

Instructor's Signature
(Verifying Satisfactory Completion)

Date

LESSON PLAN: 9

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: VIII-9 OR DEMONSTRATION:

ADVANCED SINGLE-COLOR FILM ASSEMBLY TECHNIQUES
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Describe two ways to attach inserts.
2. List at least four advanced film assembly techniques.
3. Describe the purpose of a pin register system.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Ruling on Film

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, chs. 10, 22.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, chs. 10, 13.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984, chs. 2-3.

INTRODUCTION:

A refinement of the basic skills and techniques of film assembly is necessary in order to produce the intricate images demanded by today's designer. This lesson discusses some of the more advanced techniques that some might call "tricks of the trade."

LESSON PLAN: 9

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

OUTLINE: (Key Points)

I. Advanced Techniques in Single-Color Film Assembly

NOTE: All techniques are not used on all assembled flats. These techniques, however, involve skills that must be developed by the film assembly technician. (The instructor may wish to demonstrate only some of these methods.)

A. Fine detail opaquing

1. Repairing or replacing missing or broken dots and characters

a. Work on emulsion side.

b. Use crow quill pen or #00 brush.

c. Use cotton swabs to remove mistakes.

2. Ruling with opaque (HO 1)

a. Use straight edge.

b. Use ruling pen.

3. Free-hand opaquing of irregular shapes

a. Outlining halftones

b. Hand painted masks and dropouts

B. Attaching inserts

1. In clear film windows

2. By mortising

C. Using complementary flats (double printing, double exposure, double burning)

1. Used when illustrations need to be combined with type or other matter, or when two halftones butt or are too close to easily strip on the same flat

a. Overprints (surprints) - type printing over a halftone or screen tint

        a. Overprints (surprints) - type printing over a halftone or screen tint

        b. Halftones located close to or touching each other; more working clearance needed

        c. Reverses

        d. Halftones within borders

    2. Some printing houses routinely strip all linework on one flat, and halftones on one or two complementary flats.

    3. Some printing houses routinely strip marks on a second flat, using it as a universal set of marks for standard jobs and forms.

    4. Complementary flats are registered by reference edge or by a punch/pin system, each exposed separately to the plate (double burn).

D. Surprints (also surprinting, overprinting, overprints)

    1. Uses complementary flats

    2. Flats should be pin registered.

    3. Line negative in register with halftone or tint will, when separately exposed, "burn out" that area of the halftone or tint and make an image.

    4. Positive plates require two combined film positives sandwiched together to make surprint. One exposure is required.

E. Knockouts (also reverses) - a line image which is void of an ink impression; "white paper image"

    1. Uses two negatives such as a halftone negative and a line negative of type

    2. Line negative is contacted (reversed).

    3. Resulting reverse or film positive is sandwiched together with the halftone negative. The solid image of the positive "knocks out" that area of the halftone leaving an image void or reverse. One exposure to a plate is required.

    4. Positive plates require two burns, halftone positive and a negative knockout of the line image.

F. Photocombining - when two images butt or overlap they may be combined on film by contact methods. This process may eliminate the need for complementary flats and double burning the plate. These combined images are called composite flats. (See Unit VII for contacting details.)

G. Screen tints - screened images of a single dot size to print lighter than solid shades of black or color. Usually rated in per cent (%) of resulting ink coverage in final print. May be purchased as film and working contact duplicates can be made.

1. Screened reverse - gray with white image; film positive is sandwiched with screen tint
2. Screened surprint - black over gray image; negative of type registered on complementary flat and double burned with screen tint
3. Screened image - gray image of type or line illustrations; tint film placed in contact with the plate with the negative over it; single burn
4. Screened type image with solid background; screen film is sandwiched with negative of type or illustration and reversed to another film; resulting positive is inserted into flat as negative; positive will be clear film with gray type
5. Adjoining tints of differing values (See demonstration lesson 16, of this unit.)

H. Screen tint film assembly

1. Screen emulsion must contact plate emulsion
2. Line negative flat is positioned with emulsion up and screen tint film is positioned emulsion up and attached.
3. Overlapping or butted screen and halftones must have angle differentials of 30° or a moire pattern will result.

I. Silhouetting halftones - outlining and background drops; background detail is removed by blocking out the dots in the halftone negative (See demonstration lesson 15 of this unit.)

1. Photomechanical bump - no screen exposure is given when shooting halftone; may cause objectionable change in middle tone values of halftone;

practical method only when background is a uniformly lighter tone than the rest of the photo

2. Opaquing - remove background by painting out with opaque; requires skill
3. Hand cutting mask - peelable masking registered with halftone; image is cut out and peeled, making a window for the outlined halftone
4. Photomechanical dropout mask - line shot of photo gives natural shape to mask; some hand opaquing is required; works best with photo that has a light background

II. Positives and Positive Plates

Positive plates have lost many of their advantages during the past few years. The added cost and time in preparing positives seems to outweigh many of the advantages they once enjoyed. Stripping negatives, which will be contacted to make positives, requires a different orientation to emulsion, opaquing and some basic thinking. Seldom do you see both positive and negative plates being made in the same plant. Because of the above, this unit does not explore, in detail, working with positives. It should be noted, though, that positives can be double exposed, burned out and be every bit as flexible as negatives. After all, positives are made from negatives.

III. Multiple Imaging of Plates

There are a number of systems and machines to aid in the accurate production of multiple image plates. These are called step and repeat photocomposition machines or photoimposition machines. In addition, simple multiple imaging can be accomplished with basic pin registering equipment. Plate step and repeat equipment is covered under "Step and Repeat Devices" in Unit X. Many of the modern "step and repeat machines" are capable of much more than step and repeat. They are, in reality, automated image assembly devices discussed later in this outline. It should be noted that most step and repeat devices will produce multiple images on either plates or film. (See also Unit I for information on calculating the machine layout.)

IV. Register Systems - purpose of register system is to make preplate operations more accurate and to properly locate the image on the plate in order to minimize adjustments

A. Art-to-press systems - good registration starts with the paste-ups; artboards are pinned so that all overlays will fit; camera copyboard is similarly pinned to accept the artboard

1. Register pins in the camera film back for the film
2. Stripped flats are punched and pinned to register together.
3. Plates are punched to accept the regular pins of the flats.
4. Press may have pins on the plate cylinder to guide the plate into place.

B. The most active area for register pins is in the film image assembly area. In no other way can complementary flats and multicolor flats be accurately positioned to accomplish the complex composites that are routinely produced in the modern printing industry.

1. Some types of pin register systems
    a. Tab and button method
        (1) Uses punched tabs
        (2) Tabs fit preglued buttons
        (3) Suitable for most complementary flat work
    b. Punched hole method - similar to tab and button, but masking material is punched; usually a quantity punched before job begins
2. Register punches - usually punched three holes at a time
    a. Will punch flats and plates
    b. Have fixed spacing for repeatability
    c. Have material hold-down for accuracy
    d. Many sizes available
    e. Many styles available
    f. Often have elongated holes to accommodate change in size of masking material
    g. May be self-centering

V. Summary and Conclusion

A. Advanced techniques in single-color film assembly

B. Positives and positive plates

C. Multiple imaging of plates

D. Register systems

LESSON PLAN: 9

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. Why shouldn't you scrape spots of emulsion from halftone windows?

2. Why should you avoid double layers of film or tape?

3. What is one way to outline or silhouette a halftone?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Instructor should collect and place on display examples of printing that demonstrate the use of:

    a. Ruling
    b. Outlining of irregular shapes
    c. Silhouette halftones
    d. Buffed screen tints
    e. Buffed halftones
    f. Halftones with line borders
    g. Surprint (overprint) type on halftone, type on screen tint
    h. Reverse (knockout) of type from halftone, type from screen tint, type from solid
    i. Two or more combined halftones overlapping or touching

LESSON PLAN: 9

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS:

1. When solid pieces of red or black are placed on the paste-up to position halftones, they are called windows. Why?

2. Name two ways to fasten a halftone in position in a window.

3. When there is an excessive amount of broken characters, missing halftone dots, and other repair work to do on the negatives, what is the preferable alternative to fine detail opaquing?

4. Define outlining.

5. When mortising in an insert, why should the stripper always use a T-square and triangle to guide the cutting?

6. Check all of the following film assembling techniques that require complementary flats to accomplish.

   a.( ) Overprinting type on a halftone
   b.( ) Reversing type (knockout) out of a solid
   c.( ) Reversing line art out of a screen tint
   d.( ) Overprinting line art with screened type
   e.( ) Butting two halftones
   f.( ) Making a silhouette halftone of a person
   g.( ) Screening line art to a 20% tint

h.( ) Making a surprint of solid type over screened line art
i.( ) Knocking out type in a dark area of a halftone

7. Describe the technique for combining two screen tints in order to butt two areas of different tint values.

8. Why, when cutting two layers of film to mortise an insert, should the stripper angle the blade away from the correction?

9. When there is insufficient space around a window to tape the halftone insert, what other methods might be used? Describe two.

10. What remedies may be taken when the window of a line negative has spots in it?

LESSON PLAN: 9

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

ANSWERS TO EVALUATION ITEMS:

1. Solids on the paste-up used to position halftones are called windows because when photographed they become clear areas on the negatives through which the halftone will "look through."

2. Use small tabs of tape in the corners or glue into window using the glue from brown shipping tape.

3. It will probably be more economical to go back to the mechanical art to repair the mistakes and then reshoot a corrected negative.

4. Outlining is an opaquing process in which the stripper paints out unwanted background in a halftone negative.

5. Cutting a square box through both negatives assures that the insert is square and has no film edge overlaps.

6. Students should place check marks by the following: a, d, e, h.

7. When it is required that two screen areas butt, the tint of the lighter value is placed over the entire area. A screen tint of a value equal to the difference between the light area and the dark area is placed over the area to be darker. The combination of the two screen values will make the darker area. The second screen must be angled at 30° to the first screen.

8. The stripper should angle the blade when cutting in a correction or insert so that the hole into which the change is inserted is slightly larger than the insert. This will help avoid overlapping film edges.

9. Insufficient space around a window may require:

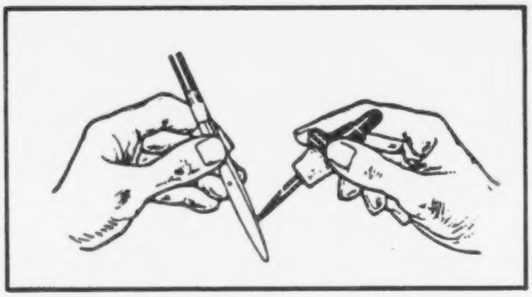
   a) Gluing the halftone into the window; can be done using the clear glue found on shipping tape

   b) Cutting a window in a complementary flat to strip the halftone into; the unused window must be masked out

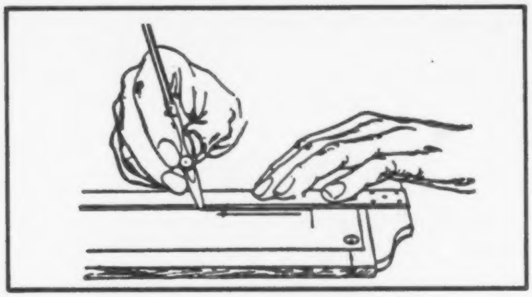
10. Spots in a halftone window must be bleached out, not scraped. If it is too bad the clear area may be cut out; film thickness may cause diffusion around the edges of the halftone. If there are a lot of windows with spots, it may be necessary to repair the art and reshoot the negative. An alternative is to cut windows in a complementary flat.

HO 1

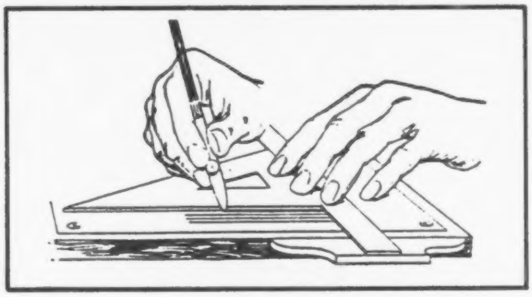
Ruling on Film



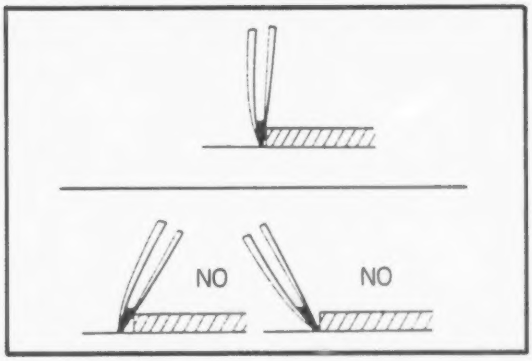
Fill the pen with opaquing liquid. Use a dropper or quill pen to fill it.



Rule horizontal lines from top of work to bottom. Right-handed persons should have T-square head on left side of table. Left-handed persons should have T-square on right side of table.

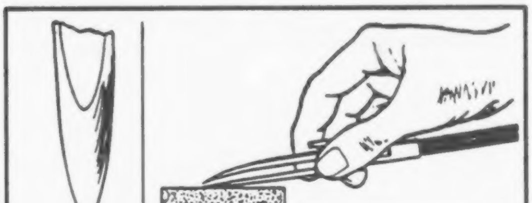


Vertical lines should be ruled using a triangle against the T-square. Right-handed persons should use the guide edge of the triangle to the left, reaching over the triangle to do ruling. Left-handed persons should use the guide edge of the triangle to the right, reaching over the triangle to do ruling.



Hold pen in a vertical position to allow nibs to make proper contact with the ruling surface.

Improper ruling positions



Correctly shaped ruling pen nibs.

Sharpen pen nibs on a sharpening stone.

Note: The same ruling techniques should be observed when ruling with a technical pen.

LESSON PLAN: 10

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: OR DEMONSTRATION: VIII-10

MORTISING AND ATTACHING INSERTS IN CLEAR OR OPEN WINDOWS
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. List the three major ways of attaching inserts to master flats.
2. Describe and demonstrate the difference between each method.
3. Explain the advantages and disadvantages of each method.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. Negatives, original and correction
2. Table
3. Masking tape
4. Straight-edge and blade
5. Opaque
6. Halftone
7. Scissors
8. Tape tabs
9. Brown shipping tape

10. Vinyl masking sheet
11. Clear film
12. T-square
13. Pencil

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

INTRODUCTION:

Attaching inserts to the master flat or making complementary flats to insert material may be one of the most important techniques the student may learn in film assembly. More plate remakes due to stripping problems are caused by improper inserts than by any other mistake. Halftone edge diffusion, crooked mortises, ragged halftone edge, diffused type near inserts, and overlapping film edges are all problems that this lesson can help alleviate.

LESSON PLAN: 10

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

STEPS OF PROCEDURE:

1. Make a type correction on a negative by mortising.
   a. Turn negative emulsion down; tape to glass of table.
   b. Position smaller correction negative in register on top of original.
   c. Tape correction negative to original on two edges.
   d. Cut around correction through both negatives using straight edge and blade. Leave as much room around correction for taping as possible.
   e. Cut with blade slanting out away from correction so that hole into which the correction will be inserted is slightly larger than the insert.
   f. Remove the waste from the correction negative and drop the insert (correction) into the hole left in the negative. Tape around entire correction insert. Cut and peel tape away where it covers type. Touch up with opaque.
2. Insert halftone in clear window.
   a. Turn flat emulsion up.
   b. Position halftone negative emulsion up in window. Follow crop marks on halftone for positioning. If no marks are available, position halftone using good judgement and rules of photographic composition.
   c. Tape, with masking tape, two sides of halftone negative. With straight edge and knife point, carefully scribe a line in the emulsion around the window slightly larger than the window. Leave as much space around the window as possible without interfering with other image areas.
   d. Remove masking tape and halftone and carefully trim halftone on scribed line. Scissors work best for this. (Alternative method: Place clear film between negative and halftone and cut halftone out with blade instead of scribing. Be careful not to cut through clear film.)

e. Position trimmed halftone negative in window, emulsion away from window. Attach halftone with small tape tabs at each corner or wherever the tape will not interfere with other images.

f. If there is no room for taping, attach halftone to window with the clear glue from brown shipping tape.

  (1) Hold halftone in position in window.

  (2) Lick small strip of brown shipper's tape and insert between halftone negative and window.

  (3) Holding down halftone negative in position, slide the brown tape out of this sandwiched position. this will drag a small amount of glue from the tape and deposit it on the negatives.

  (4) Hold in position for about a minute for the glue to set. Handle this flat carefully.

g. If a number of halftones are so close to other images that there is insufficient room for taping, consider cutting new windows into a complementary flat.

3. Insert halftone in open window.

NOTE: Inserting into open windows is much easier than in clear windows because more nonimage area can normally be left around the halftone.

a. Halftones should be positioned, marked, trimmed and taped in the same manner as above for clear windows.

b. Windows should be cut into a vinyl complementary mask by positioning and pin registering the blank masking sheet over the original negative flat. Mark the windows using T-square and pencil, remove masking from negative flat and cut windows. Overcuts at window corners can be taped. Windows may also be cut in position over the negative flat by inserting a piece of clear film between the vinyl masking and the negative flat to protect the negative.

c. When halftones are positioned very close to each other or are butted, it may be necessary to use more than one complementary halftone window mask.

LESSON PLAN: 10

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. Discuss the three major ways of attaching inserts to master flats; describe the differences, advantages and disadvantages of each method.
2. What are some of the problems that require a plate to be "remade?"

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 10

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS: NAME OF STUDENT: ____________________

MORTISING OR ATTACHING INSERTS IN CLEAR OR OPEN WINDOWS

EQUIPMENT:

1. Negatives, original and correction
2. Table
3. Masking tape
4. Straight-edge and blade
5. Opaque
6. Halftone
7. Scissors
8. Tape tabs
9. Brown shipping tape
10. Vinyl masking sheet
11. Clear film
12. T-square
13. Pencil

DID THE STUDENT:	YES	NO
1. Make a type correction on a negative by mortising. a. Turn negative emulsion down; tape to glass of table.		
b. Position smaller correction negative in register on top of original.		
c. Tape correction negative to original on two edges.		
d. Cut around correction through both negatives using straight edge and blade.		
e. Cut with blade slanting out away from correction so that hole into which the correction will be inserted is slightly larger than the insert.		

DID THE STUDENT:	YES	NO
f. Remove the waste from the correction negative and drop the insert (correction) into the hole left in the negative. Tape around entire correction insert. Cut and peel tape away where it covers type. Touch up with opaque.		
2. Insert halftone in clear window. a. Turn flat emulsion up.		
b. Position halftone negative emulsion up in window. Follow crop marks on halftone for positioning. If no marks are available, position halftone using good judgement.		
c. Tape, with masking tape, two sides of halftone negative. With straight edge and knife point, carefully scribe a line in the emulsion around the window slightly larger than the window.		
d. Remove masking tape and halftone and carefully trim halftone on scribed line. (Alternative method: Place clear film between negative and halftone and cut halftone out with blade instead of scribing.)		
e. Position trimmed halftone negative in window, emulsion away from window. Attach halftone with small tape tabs.		
f. If there is no room for taping, attach halftone to window with the clear glue from brown shipping tape. (1) Hold halftone in position in window.		
(2) Lick small strip of brown shipper's tape and insert between halftone negative and window.		
(3) Holding down halftone negative in position, slide the brown tape out of this sandwiched position.		
(4) Hold in position for about a minute for the glue to set.		
(5) Handle flat carefully.		

DID THE STUDENT:	YES	NO
g. If there is insufficient room for taping, consider cutting new windows into a complementary flat.		
3. Insert halftone in open window. a. Halftones should be positioned, marked, trimmed and taped in the same manner as above for clear windows.		
b. Windows should be cut into a vinyl complementary mask by positioning and pin registering the blank masking sheet over the original negative flat. Mark the windows using T-square and pencil, remove masking from negative flat and cut windows. Overcuts at window corners can be taped. Windows may also be cut in position over the negative flat by inserting a piece of clear film between the vinyl masking and the negative flat to protect the negative.		
c. If halftones are positioned too closely to each other, it may be necessary to use more than one complementary halftone window mask.		

The student has satisfactorily completed the procedure "MORTISING OR ATTACHING INSERTS IN CLEAR OR OPEN WINDOWS" according to the steps outlined.

Instructor's Signature
(Verifying Satisfactory Completion)

Date

LESSON PLAN: 11

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: OR DEMONSTRATION: VIII-11

FINE DETAIL OPAQUING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. List the tools needed for fine detail opaquing.
2. Describe the processes used to repair broken letters and replace missing halftone dots.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. Halftone; film
2. Large linen tester or engraver's glass
3. #00 Opaque brush or crowsquill brush
4. Black opaque
5. Small engraver's needles, pin vise or small scriber
6. Cotton swab dipped in ammonia water

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

INTRODUCTION:

Fine detail opaquing is becoming a lost craft. Techniques such as repairing broken letters, replacing missing halftone dots and changing form numbers are time consuming crafts that in many cases should be returned to the art department to be accomplished. It is often easier to reshoot a small correction and mortise it in than to attempt a hand repair job.

LESSON PLAN: 11

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

STEPS OF PROCEDURE:

1. Use a large, giant size linen tester or engraver's glass. It should be large enough to work under and powerful enough to see small detail.

2. Use a #00 opaque brush or a crowsquill brush to make detail corrections. Use finely ground black opaque. Work on the emulsion side of the film.

3. A tiny drop of opaque on the bristle of the brush can replace a missing dot in a halftone. Experience and practice will dictate the necessary amount needed. Simply touch the brush to the spot to be corrected and leave a dot of opaque. Defective dot areas in halftones can be repaired in this manner, one dot at a time.

4. Broken type should be repaired in a similar manner. Often, broken type will be overlooked by the reader, but poorly repaired type will call attention to itself. The best repair of defective type is resetting and reshooting.

5. Use small engraver's needles, pin vise, or small scriber to work on the emulsion side of the film to scrape, scratch or otherwise "open up" areas to print. Scrape lightly enough to just remove the emulsion; don't dig into the film base. Dampening the emulsion with a cotton swab dipped in ammonia water will often help in scraping small detail areas of emulsion.

LESSON PLAN: 11

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. What tools are required for fine detail opaquing?
2. Discuss the processes used to replace missing halftone dots and to repair broken letters.
3. Why is fine detail opaquing becoming a lost art?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 11

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS: NAME OF STUDENT:____________________

FINE DETAIL OPAQUING

EQUIPMENT:

1. Halftone; film
2. Large linen tester or engraver's glass
3. #00 Opaque brush or crowsquill brush
4. Black opaque
5. Small engraver's needles, pin vise or small scriber
6. Cotton swab dipped in ammonia water

DID THE STUDENT:	YES	NO
1. Use a large, giant size linen tester or engraver's glass.		
2. Use a #00 opaque brush or a crowsquill brush to make detail corrections. Use finely ground black opaque. Work on the emulsion side of the film.		
3. A tiny drop of opaque on the bristle of the brush can replace a missing dot in a halftone. Simply touch the brush to the spot to be corrected and leave a dot of opaque.		
4. Broken type should be repaired in a similar manner. The best repair of defective type is resetting and reshooting.		
5. Use small engraver's needles, pin vise, or small scriber to work on the emulsion side of the film to scrape, scratch or otherwise "open up" areas to print. Scrape lightly enough to just remove the emulsion; don't dig into the film base. Dampening the emulsion with a cotton swab dipped in ammonia water will often help.		

The student has satisfactorily completed the procedure "FINE DETAIL OPAQUING" according to the steps outlined.

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Instructor's Signature
(Verifying Satisfactory Completion)

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Date

LESSON PLAN: 12

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: OR DEMONSTRATION: VIII-12

ASSEMBLING COMPLEMENTARY FLATS
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Demonstrate double burn with pin register.
2. Describe the assembly process for making an overprint.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. Two masking sheets punched for register
2. Negative with large window
3. Negative with line of type
4. 20% screen tint
5. Stripping tools
6. Dylux™ proofing sheet
7. Litho tape
8. Opaque

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

INTRODUCTION:

Surprints and overprints may be the most common use for complementary flats. Complementary flats are necessary when butting halftones and using master register marks; they are also needed for screen overlaps, screen tint combinations, etc. This is an important set of concepts to the film image assembler and each student should accomplish the accompanying laboratory assignment.

LESSON PLAN: 12

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

STEPS OF PROCEDURE:

1. Prepare to use pin registered complementary flats.

   a. Prepunch masking material with register punch. Punch should be arranged so that center hole is in exact center of masking sheet.

   b. Mount pins or pin bar on light table. Center pin should align with center line of layout.

   c. Punch additional masking sheets to be prepared for multiple burns.

2. Perform the following assembly process.

   a. Place punched masking sheet on pins with back side up.

   b. Attach negative with window for screen tint on masking sheet emulsion side up. Turn over masking sheet and open up window by cutting away masking sheet from window. (If negative is not used, it will be necessary to cut window in masking sheet.)

   c. Turn over flat again and replace it on the pins emulsion up. Position screen tint emulsion up covering the open window. Tape in place at corners with small tabs of tape. (Note: You should point out the importance of proper screen angles if screen is to be butted or overlapped with other screens or halftones.)

   d. Place the second punched flat over the pins and covering the screen tint flat. Locate from layout or paste-up the exact position of the surprint type or art. Draw reference lines on this new flat. (If negatives have reference marks, follow them for positioning the surprint negative.)

   e. Position the negative emulsion up by the marks and tape in place on flat 2.

   f. Turn over flat 2 and cut away masking covering the surprint type or art. Do any needed opaquing on these two flats.

g. Fasten a sheet of Dylux™ proofing material emulsion up to the pins. Expose each flat one at a time to the Dylux™. The resulting proof should show the grey area of tint with solid black type overprinting it.

Cautions: Do not trap dirt between screen tint and clear window. Allow sufficient "draw down" time on the vacuum frame before exposing screen tint flat. (See Unit VII, Contacting).

LESSON PLAN: 12

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. What would be the results if both the type negative and the screen tint were stripped to one flat?
2. Why is it necessary to strip the film so that the emulsion is next to the plate or proofing material when exposing?
3. Explain the purposes of the register pins.

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 12

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS: NAME OF STUDENT:____________________

ASSEMBLING COMPLEMENTARY FLATS

EQUIPMENT:

1. Two masking sheets punched for register
2. Negative with large window
3. Negative with line of type
4. 20% screen tint
5. Stripping tools
6. Dylux™ proofing sheet
7. Litho tape
8. Opaque

DID THE STUDENT:	YES	NO
1. Prepare to use pin registered complementary flats. a. Prepunch masking material with register punch. Punch should be arranged so that center hole is in exact center of masking sheet.		
b. Mount pins or pin bar on light table. Center pin should align with center line of layout.		
c. Punch additional masking sheets to be prepared for multiple burns.		
2. Perform the following assembly process. a. Place punched masking sheet on pins with back side up.		
b. Attach negative with window for screen tint on masking sheet emulsion side up. Turn over masking sheet and open up window by cutting away masking sheet from window.		

DID THE STUDENT:	YES	NO
c. Turn over flat again and replace it on the pins emulsion up. Position screen tint emulsion up covering the open window. Tape in place at corners with small tabs of tape.		
d. Place the second punched flat over the pins and covering the screen tint flat. Locate from layout or paste-up the exact position of the surprint type or art. Draw reference lines on this new flat. (If negatives have reference marks, follow them for positioning the surprint negative.)		
e. Position the negative emulsion up by the marks and tape in place on flat 2.		
f. Turn over flat 2 and cut away masking covering the surprint type or art. Do any needed opaquing on these two flats.		
g. Fasten a sheet of Dylux™ proofing material emulsion up to the pins. Expose each flat one at a time to the Dylux™. The resulting proof should show the grey area of tint with solid black type overprinting it.		

The student has satisfactorily completed the procedure "ASSEMBLING COMPLEMENTARY FLATS" according to the steps outlined.

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Instructor's Signature
(Verifying Satisfactory Completion)

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Date

LESSON PLAN: 13

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: OR DEMONSTRATION: VIII-13

REVERSES OR KNOCKOUTS
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Describe the procedure for assembling reverses in film.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. Stripping tools
2. Flat
3. Negative
4. Film
5. Point source light
6. Dylux™ proofing sheet

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

INTRODUCTION:

The film for reverses is made by contacting exposed film negatives to film to make film positives. (See Unit VII, "Contacting"). This positive film is placed over an image negative to knockout (or reverse) an area.

LESSON PLAN: 13

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII: PERFORMING FILM IMAGE ASSEMBLY

STEPS OF PROCEDURE:

1. Strip up the flat including all halftones, tints, etc. which are to have reversed areas.

2. Contact the negative of the image to be reversed to film. (See Unit VII, Contacting)

    a. Film - emulsion down

    b. Negative - emulsion down over film

    c. Expose with point source light

    d. Process

3. Position contact (clear film with black image) over halftone or tint to have reversed area.

    (NOTE: Film positive used for reverse must be larger than halftone or tint as edge of film will cause a diffused line in the image.)

4. Proof on Dylux™ to show finished reversed area.

LESSON PLAN: 13

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. How is film for reverses made?
2. Why must the film positive for reverses be larger than the halftone or tint?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 13

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS: NAME OF STUDENT: ____________________

REVERSES OR KNOCKOUTS

EQUIPMENT:

1. Stripping tools
2. Flat
3. Negative
4. Film
5. Point source light
6. Dylux™ proofing sheet

DID THE STUDENT:	YES	NO
1. Strip up the flat including all halftones, tints, etc. which are to have reversed areas.		
2. Contact the negative of the image to be reversed to film. a. Film - emulsion down		
b. Negative - emulsion down over film		
c. Expose with point source light		
d. Process		
3. Position contact (clear film with black image) in position over halftone or tint to have reversed area.		
4. Proof on Dylux™ to show finished reversed area.		

The student has satisfactorily completed the procedure "REVERSES OR KNOCKOUTS" according to the steps outlined.

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Instructor's Signature
(Verifying Satisfactory Completion)

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Date

LESSON PLAN: 14

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: OR DEMONSTRATION: VIII-14

COMBINING AND/OR BUTTING IMAGES
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Demonstrate butting two halftones by using complementary flats.

2. Combine a simple line image with a halftone by using complementary masks or flats.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. Halftones
2. White paper layout or blue key
3. Light table
4. Masking sheet
5. Negative
6. Stripping tools
7. Register pins
8. Dylux™ proofing sheets
9. Red litho tape or vinyl masking

10. Sample line drawing and sample photograph

11. Opaque

12. Duplicating film

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INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

INTRODUCTION:

Butting halftones - some layouts call for photographs to be touching - is a very difficult stripping procedure if using only a single flat. Stripping butting images on the same flat will usually result with a gap or white line showing between the images, or a dark line showing where the images overlap. Butting images can be a relatively simple procedure by using more than one flat and making multiple burns as demonstrated in this lesson.

LESSON PLAN: 14

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII: PERFORMING FILM IMAGE ASSEMBLY

STEPS OF PROCEDURE:

1. Carefully perform these steps for butting halftones.
   a. Position white paper layout or blue key on the light table. If layout or blue key is not available, draw an accurate layout on a masking sheet transferring the dimensions from the paste-up or the line negative.
   b. If windows or keylines are on the negative, strip that into position to use as a guide.
   c. Place masking sheet on pins over layout or key negative.
   d. Carefully cut halftone windows in masking sheet for all halftones with space between them. If the layout calls for rows of photos, cut a window for every other one. Work in a checkerboard pattern.
   e. Position another masking sheet on the register pins and carefully cut the remaining windows. Be careful to align the edges and sides of the windows with each other.
   f. Strip the halftone negatives into the windows. Some of the halftones will be on one flat, some on the other. If there are a large number of butting halftones, it may be necessary to use three complementary flats.
   g. Proof the flats on Dylux™ material to check for alignment. Adjust any position problems with red litho tape or by cutting the windows larger. Vinyl masking works best for this process. The above process works well for a photo montage in which illustrations are inset into each other, etc.
2. Combine images in stripping. (At times, the film assembler is called upon to combine two or more images into one. Example: We have a line drawing of a toy train and wish to place the head and shoulders of a young boy looking out the window of the train. We have a photograph of the boy.)
   a. The line drawing of the train should be on the paste-up. Scale the photo to fit in the reproduced size of the train.

b. Position the line negative on the flat. Cut open the mask and opaque.

c. On a complementary flat, position the halftone of the boy in the train window. Pin register the second flat over the line negative.

d. Carefully cut open the halftone negative in the area of the train window so that only that portion of the halftone will print.

e. Reverse positions of the two flats so that the line negative is on top of the halftone negative flat.

f. Carefully opaque out any lines on the line negative through which halftone dots show. In other words, remove any lines that would print on or across the image of the boy.

g. Proof these flats by double burning on Dylux™. Check for accuracy and make corrections or adjustments.

h. In order to maintain this delicate accuracy, you may wish to make a composite negative by contacting double burn to duplicating film. This single negative can then be stripped in place of the two original negatives.

LESSON PLAN: 14

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. What are butting halftones? When can this be a difficult procedure?
2. What problems can result from stripping butting images on the same flat?
3. How can butting images become a relatively simple procedure?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 14

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS: NAME OF STUDENT: ____________________

COMBINING AND/OR BUTTING IMAGES

EQUIPMENT:

1. Halftones
2. White paper layout or blue key
3. Light table
4. Masking sheet
5. Negative
6. Stripping tools
7. Register pins
8. Dylux™ proofing sheets
9. Red litho tape or vinyl masking
10. Sample line drawing and sample photograph
11. Opaque
12. Duplicating film

DID THE STUDENT:	YES	NO
1. Carefully perform these steps for butting halftones. a. Position white paper layout or blue key on the light table. If layout or blue key is not available, draw an accurate layout on a masking sheet.		
b. If windows or keylines are on the negative, strip that into position to use as a guide.		
c. Place masking sheet on pins over layout or key negative.		
d. Carefully cut halftone windows in masking sheet for all halftones with space between them. If the layout calls for rows of photos, cut a window for every other one. Work in a checkerboard pattern.		

DID THE STUDENT:	YES	NO
e. Position another masking sheet on the register pins and carefully cut the remaining windows.		
f. Strip the halftone negatives into the windows.		
g. Proof the flats on Dylux™ material to check for alignment. Adjust any position problems with red litho tape or by cutting the windows larger. Vinyl masking works best for this process.		
2. Combine images in stripping. Example: We have a line drawing of a toy train and wish to place the head and shoulders of a young boy looking out the window of the train. We have a photograph of the boy. a. The line drawing of the train should be on the paste-up. Scale the photo to fit in the reproduced size of the train.		
b. Position the line negative on the flat. Cut open the mask and opaque.		
c. On a complementary flat, position the halftone of the boy in the train window. Pin register the second flat over the line negative.		
d. Carefully cut open the halftone negative only in the area of the train window so that only that portion of the halftone will print.		
e. Reverse positions of the two flats so that the line negative is on top of the halftone negative flat.		
f. Carefully opaque out any lines on the line negative through which halftone dots show.		
g. Proof these flats by double burning on Dylux™. Check for accuracy and make corrections or adjustments.		

DID THE STUDENT:	YES	NO
h. In order to maintain this delicate accuracy, you may wish to make a composite negative by contacting double burn to duplicating film. This single negative can then be stripped in place of the two original negatives.		

The student has satisfactorily completed the procedure "COMBINING AND/OR BUTTING IMAGES" according to the steps outlined.

Instructor's Signature
(Verifying Satisfactory Completion)

Date

LESSON PLAN: 15

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: OR DEMONSTRATION: VIII-15

OUTLINING HALFTONES
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Outline or silhouette a halftone using both the opaquing method and the cut-and-peel masking method.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. Masking sheet
2. Negative with halftone window
3. Halftone negative to be outlined
4. Stripping tools
5. Selection of No. 00 and No. 2 opaque brushes
6. Ruling pen
7. Dylux™ proof sheet
8. Litho tape
9. Opaque
10. Cotton swabs

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

INTRODUCTION:

Quite often, for one reason or another, undesirable backgrounds of photos must be removed. Although this silhouetting can be done on the copy, it is still necessary to mask the background on the negative.

LESSON PLAN: 15

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII: PERFORMING FILM IMAGE ASSEMBLY

STEPS OF PROCEDURE:

1. Make a silhouette by opaquing.
    a. Carefully eliminate the unwanted background of the halftone with opaque. Outline the silhouette image using a fine detail brush.
    b. Work on the base side of the film. Unwanted opaque can be removed by careful scraping or with a damp cotton swab.
    c. Place the finished outlined halftone on the flat in position or in the window. The outlining opaque will be sandwiched between the window and the halftone, so be sure it is dry. Tape halftone in position at corners.
    d. Proof on Dylux™ material.
2. Cut an outline mask.
    a. Tape halftone negative, right reading, on the back or base side of a piece of ruby cut-and-peel film. Turn over.
    b. Carefully cut around image of halftone to be silhouetted. Cut through only the ruby lacquer.
    c. Peel the ruby material covering the image. This will make a mask or window for the halftone.
    d. This method works best for images with straight lines. Irregular lines are difficult to cut accurately in ruby cut-and-peel film. A swivel blade knife is helpful for this. Always use a straight-edge to cut straight lines.
    e. Minor corrections or adjustments can be made using opaque on the clear surface of the cut-and-peel mask.

LESSON PLAN: 15

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. How is a silhouette image outlined?
2. What knife works best to cut irregular lines in ruby cut-and-peel film?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 15

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS: NAME OF STUDENT: ____________________

OUTLINING HALFTONES

EQUIPMENT:

1. Masking sheet
2. Negative with halftone window
3. Halftone negative to be outlined
4. Stripping tools
5. Selection of No. 00 and No. 2 opaque brushes
6. Ruling pen
7. Dylux™ proof sheet
8. Litho tape
9. Opaque
10. Cotton swabs

DID THE STUDENT:	YES	NO
1. Make a silhouette by opaquing. a. Carefully eliminate the unwanted background of the halftone with opaque. Outline the silhouette image using a fine detail brush.		
b. Work on the base side of the film. Unwanted opaque can be removed by careful scraping or with a damp cotton swab.		
c. Place the finished outlined halftone on the flat in position or in the window. The outlining opaque will be sandwiched between the window and the halftone, so be sure it is dry. Tape halftone in position at corners.		
d. Proof on Dylux™ material.		
2. Cut an outline mask. a. Tape halftone negative, right reading, on the back or base side of a piece of ruby cut-and-peel film. Turn over.		

DID THE STUDENT:	YES	NO
b. Carefully cut around image of halftone to be silhouetted. Cut through only the ruby lacquer.		
c. Peel the ruby material covering the image.		
d. Irregular lines are difficult to cut accurately in ruby cut-and-peel film. A swivel blade knife is helpful for this. Always use a straight-edge to cut straight lines.		
e. Minor corrections or adjustments can be made using opaque on the clear surface of the cut-and-peel mask.		

The student has satisfactorily completed the procedure "OUTLINING HALFTONES" according to the steps outlined.

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Instructor's Signature
(Verifying Satisfactory Completion)

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Date

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LESSON PLAN: 16

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: OR DEMONSTRATION: VIII-16

COMBINING SCREEN TINTS
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Combine two different screen tint values on complementary flats in order to generate a third value.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. Two areas of different screen values (10% coverage-30% coverage)
2. 10% screen tint, 20% screen tint
3. Complementary flat
4. Dylux proof sheet

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

INTRODUCTION:

It is difficult to butt two screen tints and still avoid both dark lines caused by overlap and white lines caused by gaps. This problem may be solved by using complementary flats as demonstrated in Unit VIII, lesson 14. A more desirable method to butt screen tints is to combine them as demonstrated in this lesson.

LESSON PLAN: 16

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

STEPS OF PROCEDURE:

NOTE: The designer has determined that two areas of different screen values should butt. Example: an area of 10% coverage should butt against another area of 30%. If we try to butt these, a harsh joining line will result.

1. Cover the entire area (both the 30% and 10%) with a 10% screen tint. The screen tint should be fastened into the window with the screen emulsion toward the plate.
2. On a plate complementary flat in the 30% tint area, lay in a 20% screen. This screen tint will need to be angled at 30° difference from the 10% screen tint.
3. When these two flats are double burned, the 20% tint will combine with the 10% to form 30% coverage in the 30% area.
4. There should be no harsh line or gap where these screened areas join.
5. Proof on Dylux.

LESSON PLAN: 16

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. What problems can occur when two screen tints are not butted properly?

2. What methods can be used to avoid these problems?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 16

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS: NAME OF STUDENT: ____________________

COMBINING SCREEN TINTS

EQUIPMENT:

1. Two areas of different screen values (10% coverage - 30% coverage)
2. 10% screen tint, 20% screen tint
3. Complementary flat
4. Dylux™ proof sheet

DID THE STUDENT: YES NO

NOTE: Two areas of different screen values should butt. Example: an area of 10% coverage should butt against another area of 30%.

1. Cover the entire area (both the 30% and 10%) with a 10% screen tint. The screen tint should be fastened into the window with the screen emulsion toward the plate.

2. On a complementary flat in the 30% tint area, lay in a 20% screen. This screen tint will need to be angled at a 30° difference from the 10% screen tint.

3. When these two flats are double burned, the 20% tint will combine with the 10% to form 30% coverage in the 30% area.

4. There should be no harsh line or gap where these screened areas join.

5. Proof on Dylux™.

The student has satisfactorily completed the procedure "COMBINING SCREEN TINTS" according to the steps outlined.

____
Instructor's Signature
(Verifying Satisfactory Completion)

____
Date

LESSON PLAN: 17

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: VIII-9 OR DEMONSTRATION:

ASSEMBLING CLOSE REGISTER, MULTICOLOR
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Describe the use of spreads and chokes.
2. Explain how all colors are produced by the over printing of the standard process colors.
3. Differentiate between fake color and full process color printing.
4. List two common dot patterns.
5. Explain screen rulings and list common ones.
6. Describe moiré pattern and how to avoid it.
7. Describe automated film assembly and how it is accomplished.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Screen Angles; Screen Percentages; Moiré Pattern

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 10.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, chs. 10, 13.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984, chs. 10, 12.

INTRODUCTION:

Intricate color film assembly calls on all the skills and techniques of an experienced journeyman stripper. The techniques of this lesson must be constantly practiced until they become second nature.

LESSON PLAN: 17

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

OUTLINE: (Key Points)

I. Film image assembly for color printing

   NOTE: For the most part, stripping for color work is simply a refinement of single color film assembly. More care must be taken with register, image overlap (spreads and chokes), screen angles, screen values, and color matching by combining screen tints.

   A. Multicolor printing - printing of two or more inks of different valves

      1. Process color printing - producing a full variety of colors by printing a set of standard (process) colors (magenta, cyan, yellow and black); made from a colored original by color separation; requires a minimum of four flats.

      2. Fake color printing - color printing from a black and white original usually using process colors and flat screen tint values to imitate full four-color process work; normally created from line art such as comic strips.

      3. Spot color printing - adding of color to a printed job in select areas: panels, tints, display type, illustrations, etc.

   B. Register considerations - agreement in position of two or more color printings

      1. Register marks - aids in aligning each color; overprinted marks aid press operator

      2. Hairline register - two colors are butted without overlap; process color is in this category

      3. Loose register - slight variations of color press register are not critical; the overlapping or butting of colors is not important

      4. Lap register - slight overlapping of one color over the other in a narrow band makes register and fit easier for the press operator; usually this color overlap is made photographically in the contact room; these are called spreads and chokes.

C. Spreads and chokes - spreads (make bolder image) and chokes (shrink or lighten the image) are necessary in order to give the press operator some overlap between adjacent colors; the amount of overlap required depends on color combinations, press condition, type of paper, type or image characteristics, etc.; spreads and chokes are accomplished by techniques of contacting (See Unit VII).

D. Screen tints - used for both black and white printing and for multicolor printing. Used to increase the apparent number of colors available from the three process colors plus black. In fact, virtually any tone or shade of any color can be achieved using various tints and solids of the colors printed in combination. Using these tints this way simulates full process color work and is often called "fake process color."

1. Dot patterns
    a. Round dot - most common
    b. Square dot - tendency to fill in
    c. Other patterns - uncommon except for special effects
2. Screen ruling - same as halftone screens; dots or lines per inch
    a. 65-line
    b. 85-line
    c. 100-line - most common in newspaper
    d. 110-line
    e. 120-line
    f. 133-line - most common in black and white commercial and web
    g. 150-line - most common color commercial
3. Screen values - the size of the dot and its relationship to the amount of paper covered with ink (For example, a 25% screen tint will produce a printed image of dots that covers 25% of the image area with dots.)

4. Screen angles - in color printing, screens that will overprint one another will form a moiré pattern unless properly angled; typical stripping angles are: (HO 1)

   a. Cyan - 105°

   b. Yellow - 90°

   c. Magenta - 75°

   d. Black - 45°

   e. Screen angles are generally every 30°; however, yellow forms the least noticeable pattern and is therefore angled at 15° between cyan and magenta.

   f. Screen tints manufactured at these predetermined angles are available.

5. Screen determiner - a tool or combination of tools is available which will assist the film assembler in determining screen ruling and screen angle; densitometer is useful in evaluating the dot size (%)

6. Color matching with screen tints

   NOTE: Compare desired color to a "patch" on a color chart. Chart will indicate which values of screens are needed for each color. For example, a special flesh color may be made up of 70% yellow, 40% magenta, and 10% cyan. Many color matches do not require black.

E. Assembling process color flats

1. Use orange vinyl or polyester sheets (not paper) for masking; these are dimensionally stable for good register.

2. Prefer clear, polyester sheets to orange vinyl.

3. Make composite negative or positive of each set of flats for each color.

   a. Combine all flats for each color into one

   b. Excessive (too many) exposures on plates increase chance of misregister

   c. Remakes of plates are quicker

d. Reduces exposures for step and repeat

e. Chance to check for fit and omission of exposures

f. Strip flats to make negatives with emulsion down on top of masking material; this allows composite negatives or positives to be made with the emulsion oriented correctly for platemaking

g. Composite negatives can be made with duplicating film

h. Composite flats can be exposed to contact film to make film positives

4. Punch all flats and use pin register.

5. Make master marks flat; layout made on orange vinyl; marks stripped into position.

6. Make all photomechanical conversions before starting to assemble.

   a. Spreads and chokes

   b. Reverses and knockouts

7. Assemble negatives with type.

8. Assemble key flat, often cyan, because it has most detail. All other flats will be assembled in register to it.

9. Register all other color negatives over this key flat. It will be difficult to see if one negative is in position over the other. A diffusion sheet of light weight tissue paper between the negatives will help. OR

10. Make contact of key flat (to positive) to make a stripping key which will be easier to register other colors to. OR

11. Make a positive on special blue key material to use as stripping key. The positive image will be in blue and will be an easy image to which the negatives can be registered.

12. All flats (including the key) must be pin registered.

13. Strip in any spreads, chokes, reverses, etc.

14. Opaque all line work, add any ruling, hand work, or outlining that is necessary.

15. Identify flats; mark all flats so when combined on film or plate no exposure will be omitted.

    Example: Cyan #1 of 4 (no mask)
    Cyan #2 of 4 (use mask A)
    Cyan #3 of 4 (use mask B)
    Cyan #4 of 4 (use mask A)
    Also, expose set of master marks to this composite.

16. Now you are ready to make plates or composite film negatives or positives.

II. Automated film assembly

A. Step and repeat machines - microprocessor controlled (See Unit X, Lesson 1)

B. Multi-imaging (imposing) camera

1. Produces one imposed image on a single piece of film or projection speed plate

2. Combines camera work with film assembly

3. Film conventionally processed

4. Microprocessor controlled

5. Expensive

6. Example: OptiCopy™ (OptiCopy Co.)

C. Image alterer

1. Makes spreads, chokes, special effect type, etc.

2. More predictable and faster than production by hand

3. More control over amount of alteration

4. Example: Graphics Micro-Modifier™ (Byers Corp.)

D. Automatic masking

1. Cuts mechanically, or photomechanically makes masks

2. Quicker, more accurate than by hand

3. Higher quality than by hand

4. Easily makes butts and overlaps

5. Operator works at input station like a light table; it is a digitizer tablet

6. Input station produces the program which drives the output station

7. Output station - produces masks by photography or draws or cuts on peelable film

8. Example: AutoPrep 500™ (Gerber Scientific Co.)

E. Projection imaging on plate

1. Uses all components of job on 70mm film

2. Images are sequenced and positioned on plate by projection

3. Used mainly for single-color book work

4. Example: Rachwal Super 70™ (Rachwal Ind., Inc.)

F. Automatic stripping (film assembly)

1. Used for process color assembling

2. Film punched by autopunch reading cross-hair register marks by electric eye

3. Robot assembler positions film to pins

4. Example: Auto stripping™ (Chemco Co.)

III. Summary and Conclusion

A. Film image assembly for color printing

B. Automated film assembly

LESSON PLAN: 17

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. Explain the need for spreads and chokes.
2. What is a moiré pattern?
3. Why do we combine all the flats of one color into a composite negative?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Group exercise:

   Using the printed piece and a magnifier furnished by your instructor, determine the screen angle of the tint. Draw the base line and the angle of the screen, then measure the angle. Do this for each printed sample furnished.

   Instructor:

   You should have magnifiers; printed samples and screen angle indicators (or protractors) available to use for this guided group project. Have Handout 1, Screen Angles; Screen Percentages; Moiré Pattern available for the student to refer to.

2. Classroom Display:

   Show negatives of a stripped process color job, along with the press plate and printed samples. If possible, display progressive proofs with this job also. See your local printer or a member of your advisory committee to obtain this material.

LESSON PLAN: 17

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS:

1. Why should process color be stripped onto mylar flats rather than directly into windows in vinyl masking?

2. What is a key flat?

3. Describe the difference between register and fit.

4. What are the standard screen angles for each process color?

5. Referenced from a horizontal base line, which row of dots in a screen should be used for measuring screen angle?

6. Describe how to measure screen percentage values by inspection.

7. How else might you measure screen values?

8. What is fake color? Why does it carry that name?

9. Name at least three companies that make automated equipment to assist in the process of film image assembly.

10. What are the implications of this kind of equipment and the further development of similar systems on the traditional role of the stripper? What are the implications for education? Do you think the stripper of the future should be called a "film assembly technician"?

LESSON PLAN: 17

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

ANSWERS TO EVALUATION ITEMS:

1. Mylar flats are dimensionally stable. Clear film is easier to register because you can see register marks and the edges of the separation negatives. Using a single common vinyl mask assures that each negative will be framed exactly the same.

2. A key flat is simply the separation that has the most detail and to which all other separations should be positioned.

3. "Register" refers to the alignment and positioning of one color image to another. it is a concept of overall position of the entire image. "Fit" is concerned with areas of the image that do not register even though overall the image is in register. Fit problems usually occur from stripping errors. Register problems usually occur on the press.

4. Cyan - 105°; Yellow - 90°; Magenta - 75°; Black - 45°

5. The diagonal row of dots or the row of large dots that are closest together should be used to measure the screen angle.

6. By inspection, one should examine the unknown tint with a magnifier and compare the dot sizes to a known sample.

7. Densitometer

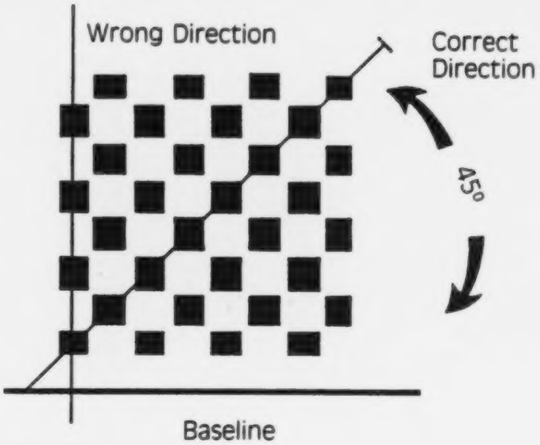
8. Fake color is a process that enables the stripper to make a full color image out of black and white art. It is done by laying in combinations of tint values to create various colors from the process printing colors. It is called fake color because there is no color in the original, but is created or "faked" by the stripper in the reproduction.

9. Opti Copy Co., Gerber Scientific Co., Chemco Co., Log-E, Beyers Corp., Rachwal Ind., Inc.

10. The role of the stripper of the future will be that of programmer and technician rather than film assembler. More formal education will be required; there will be less reliance on skill and more on knowledge.

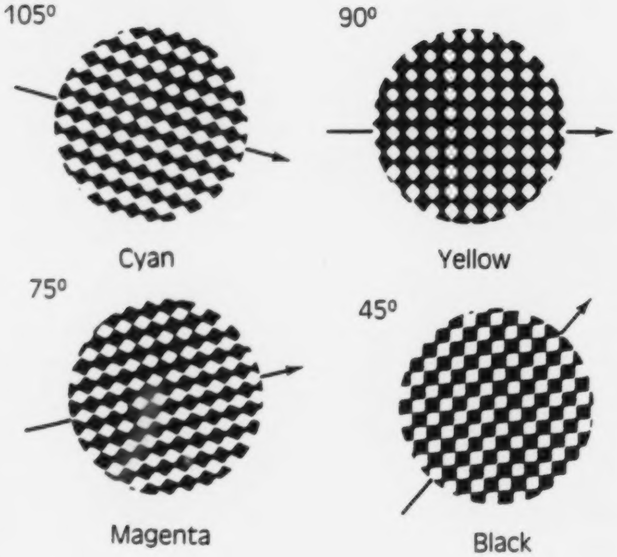
Screen Angles; Screen Percentages; Moiré Pattern

Process color screen angles must be different for each color or a moiré (more-ray) pattern will result. Measuring this angle must be done using the dot rows as shown on left.

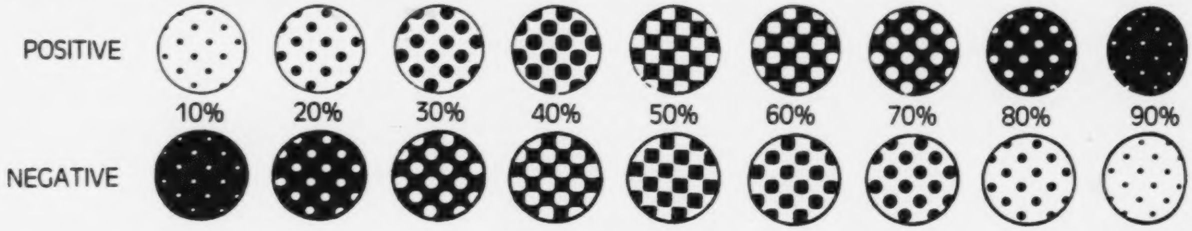

Wrong Direction
Correct Direction
45°
Baseline

Screen Angles

Screen angles for process colors have been standardized for the industry.

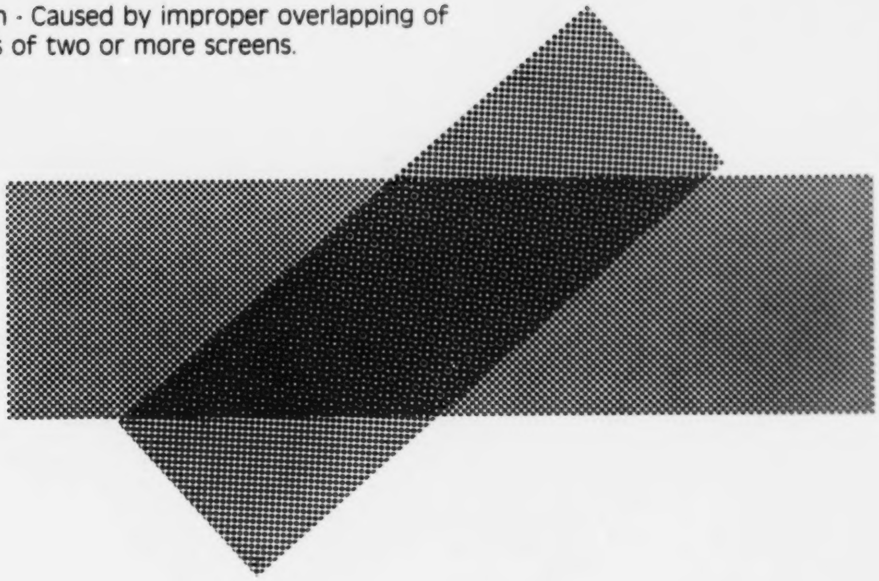

105°
Cyan
90°
Yellow
75°
Magenta
45°
Black

When examining screen tints and dot patterns under a magnifier, compare them to the illustrations here. If you are looking at a positive (printed example), use the positive dots; when looking at film negatives, use the negative dots.


POSITIVE
10%
20%
30%
40%
50%
60%
70%
80%
90%
NEGATIVE

SCREEN PERCENTAGES

Moiré Pattern - Caused by improper overlapping of screen angles of two or more screens.



LESSON PLAN: 18

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII: PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: OR DEMONSTRATION: VIII-18

ALIGNING SCREEN ANGLES
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Align two screens at a 30° angle from each other.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. Two masking sheets or flats
2. Register pins
3. Stripping tools
4. 20% screen tint
5. Magnifier
6. Straight-edge
7. Pencil
8. Tape

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

INTRODUCTION:

Misalignment of screen angles will cause a moiré pattern. Proper alignment of angles is critical to quality printing.

LESSON PLAN: 18

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

STEPS OF PROCEDURE:

1. Pin register two small masking sheets.
2. Cut two windows (one in each flat) approximately 6" x 6". These windows should overlap about half (3 x 6).
3. Strip a halftone or a 20% tint in one of the windows.
4. Using a magnifier and a straight-edge, align a row of dots and extend that line with a pencil onto the masking sheet.
5. Pin the two flats together and transfer the straight line from flat one to flat two.
6. Tape a 20% tint into the second window aligning the screen angle with the line from the first flat.
7. Observe the objectionable pattern that results (moiré).
8. Now angle the second tint 30° from the line of the first screen. Note that no pattern results. Tape the screen into position.

LESSON PLAN: 18

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. What will result if two screens are misaligned?
2. What tools are needed to properly align two screens?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 18

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS: NAME OF STUDENT: ____________________

ALIGNING SCREEN ANGLES

EQUIPMENT:

1. Two masking sheets or flats
2. Register pins
3. Stripping tools
4. 20% screen tint
5. Magnifier
6. Straight-edge
7. Pencil
8. Tape

DID THE STUDENT:	YES	NO
1. Pin register two small masking sheets.		
2. Cut two windows (one in each flat) approximately 6" x 6". These windows should overlap about half (3 x 6).		
3. Strip a halftone or a 20% tint in one of the windows.		
4. Using a magnifier and a straight-edge, align a row of dots and extend that line with a pencil onto the masking sheet.		
5. Pin the two flats together and transfer the straight line from flat one to flat two.		
6. Tape a 20% tint into the second window aligning the screen angle with the line from the first flat.		
7. Observe the objectionable pattern that results (moiré).		

DID THE STUDENT:	YES	NO
8. Now angle the second tint 30° from the line of the first screen. Note that no pattern results. Tape the screen into position.		

The student has satisfactorily completed the procedure "ALIGNING SCREEN ANGLES" according to the steps outlined.

Instructor's Signature
(Verifying Satisfactory Completion)

Date

LESSON PLAN: 19

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: OR DEMONSTRATION: VIII-19

DETERMINING TINT PERCENTAGES AND SCREEN RULINGS
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Estimate a screen with an accuracy of 15%.
2. Use a screen ruling indicator to determine the ruling of a sample screen.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. Several screen tint samples
2. Magnifier
3. Tintometer or densitometer
4. Screen ruling indicator

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. *Printing Technology*. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Spence, Wm. P. and David G. Vequist. *Graphic Reproduction*. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Peck, Harold L. *Stripping: The Assembly of Film Images*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

INTRODUCTION:

A variety of instruments are available to measure screen percentages and rulings. A student should, however, learn to estimate these with some accuracy.

LESSON PLAN: 19

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

STEPS OF PROCEDURE:

1. Taking several samples of screen tints, examine them by magnifier and compare to the examples on the handout. Mark percentages on the samples. (See HO 1 - Unit VIII, Lesson 17: Screen Angles; Screen Percentages; Moiré Pattern)

2. Check your results by measuring with a tintometer, densitometer or some other measuring instrument. Many densitometers can give you a reading in percentages, however, densities are logarithms of opacity and can be converted to percentages as follows:

Density	Percent of Light Transmitted or Reflected	Screen Dot or Halftone Dot %
0.00	100%	0%
.05	90%	10%
.12	75%	25%
.30	50%	50%
.60	25%	75%
1.00	10%	90%
3.00 +	0.1%	100% approx.

3. Use a screen ruling indicator to determine the screen ruling of each of the screen samples. Lay the indicator flat on the sample and rotate it. The ruling patch that produces the largest moiré pattern which will completely disappear when rotated is the indicator of the screen ruling. 120-, 133-, or 150-line screens are the most common for commercial offset.

LESSON PLAN: 19

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. What instruments are used to measure screen percentages and rulings? Compare each instrument.

2. What ruling patch is the indicator of the screen ruling? What screens are most common for commercial offset?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 19

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS: NAME OF STUDENT: ____________________

DETERMINING TINT PERCENTAGES AND SCREEN RULINGS

EQUIPMENT:

1. Several screen tint samples
2. Magnifier
3. Tintometer or densitometer
4. Screen ruling indicator

DID THE STUDENT:	YES	NO
1. Take several samples of screen tints, examine them by magnifier and compare to the examples on the handout. Mark percentages on the samples.		
2. Check your results by measuring with a tintometer, densitometer or some other measuring instrument.		
3. Use a screen ruling indicator to determine the screen ruling of each of the screen samples. Lay the indicator flat on the sample and rotate it. The ruling patch that produces the largest moire pattern which will completely disappear when rotated is the indicator of the screen ruling. 120-, 133-, or 150-line screens are the most common for commercial offset.		

The student has satisfactorily completed the procedure "DETERMINING TINT PERCENTAGES AND SCREEN RULINGS" according to the steps outlined.

____
Instructor's Signature
(Verifying Satisfactory Completion)

____
Date

LESSON PLAN: 20

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: OR DEMONSTRATION: VIII-20

ASSEMBLING THE FILM FOR FAKE COLOR
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. List the standard screen angles for each of the four process colors.
2. Describe how virtually any color can be represented by combinations of the four process colors in varying percentages.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. Ruby cut-and-peel film
2. Masking sheets
3. Master screen tints
4. Line art
5. Color-key proofing sheets of process colors
6. Tape
7. Opaque
8. Register marks
9. Stripper's tools
10. Screen angle
11. Ruling indicator

INFORMATIONAL ASSIGNMENT: (student)

Adams, J. Michael and David D. Faux. *Printing Technology*. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Spence, Wm. P. and David G. Vequist. *Graphic Reproduction*. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Peck, Harold L. *Stripping: The Assembly of Film Images*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

INTRODUCTION:

Although the average color stripper will do very little stripping of fake color, this demonstration and the similar lab lesson present many of the problems encountered when performing this procedure. They also introduce techniques needed for other, more common stripping processes. Fake color is a good tool for teaching about process color. It can help the student conceptually understand the basic printing colors, and how they may be combined to form virtually any other color when printed.

LESSON PLAN: 20

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

STEPS OF PROCEDURE:

1. Use two identical pieces of line art. You may wish to shoot a diffusion transfer print (PMT™) to get two pieces alike. (NOTE TO INSTRUCTOR: A good source of simple line art would be to buy two copies of the same child's coloring book and cut apart. This works well if you are going to have your students do fake color.)

2. Mount one of these pieces of line art on an illustration board and add trim marks, center marks and bull's eye/cross-line register marks in the margin.

3. The second print should be colored with colored crayons, pencils or markers. Limit yourself to four or five simple colors. It may require as many as four flats to make each of these colors. With too many colors you could end up with 15 or 16 flats to burn together.

4. Cover the colored dummy with a tissue cover sheet and identify the tint percentage of each color that is required to make the desired color. Look up this tint combination on a color chart. Mark this combination on the tissue flap over each area. (NOTE TO INSTRUCTOR: Your local color separation house should have a color chart to give to you.)

5. Shoot one line negative of the line art with register marks.

6. Strip this negative into a masking sheet and pin register to several other blank masking sheets.

7. Label one masking sheet yellow. Attach a piece of ruby cut-and-peel (Rubylith™ or other brand) film and cut and peel each area of the art that uses a particular percentage of yellow. For example, if there are several areas in the art of a color that each required a 20% yellow, then those areas should be cut open on the mask. This mask should be labeled 20% yellow.

8. Using a T-square and protractor (or screen angle indicator), mark the yellow screen angle (90%) on the mask.

9. Repeat this process for each tint value needed for yellow. If you only used five colors to color your dummy, you will have no more than five yellow flats.

10. Repeat this procedure for each color. In addition to the various tint values of black, the line negative flat should also be labeled black.

11. You might discover while making your hand-cut negatives that one or more flats are the same for more than one color. If so, use the same flat and label accordingly. Remember though, each color will require a different screen angle. Those angles are:

    Yellow - 90°
    Cyan - 105°
    Magenta - 75°
    Black - 45°

12. When laying in your screen tints, measure the screen angles accurately; be sure the screen emulsion will be down and against the proofing material or plate. Tack the screens down with tabs of easily removed masking tape. In most cases it will not be necessary to cut your screen tints.

13. Using color-key, transfer key or some other color proofing system, make color proofs of your fake color job. Mount and mat the proofs for display. If you end up with more than two or three flats per color, you should make composite negatives before proofing.

14. Another way to do fake color is to cut overlays for each color and tint value on the art, and shoot each flat or overlay as a line negative. Where this system will provide stripping practice with negatives and register marks, it will use considerably more film. (NOTE: Either way is a good stripping and learning exercise.)

LESSON PLAN: 20

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. What are the four process colors and what are the screen angles for each of these colors?
2. Describe how the combination of the four process colors can produce virtually any color.

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 20

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS: NAME OF STUDENT:____________________

ASSEMBLING THE FILM FOR FAKE COLOR

EQUIPMENT:

1. Ruby cut-and-peel film
2. Masking sheets
3. Master screen tints
4. Line art
5. Color-key proofing sheets of process colors
6. Tape
7. Opaque
8. Register marks
9. Stripper's tools
10. Screen angle
11. Ruling indicator

DID THE STUDENT:	YES	NO
1. Use two identical pieces of line art.		
2. Mount one of these pieces of line art on an illustration board and add trim marks, center marks and bull's eye/cross-line register marks in the margin.		
3. The second print should be colored with colored crayons, pencils or markers. Limit yourself to four or five simple colors.		
4. Cover the colored dummy with a tissue cover sheet and identify the tint percentage of each color that is required to make the desired color. Look up this tint combination on a color chart. Mark this combination on the tissue flap over each area.		
5. Shoot one line negative of the line art with register marks.		
6. Strip this negative into a masking sheet and pin register to several other blank masking sheets.		

DID THE STUDENT:	YES	NO
7. Label one masking sheet yellow. Attach a piece of ruby cut-and-peel (Rubylith™ or other brand) film and cut and peel each area of the art that uses a particular percentage of yellow.		
8. Using a T-square and protractor (or screen angle indicator), mark the yellow screen angle (90%) on the mask.		
9. Repeat this process for each tint value needed for yellow.		
10. Repeat this procedure for each color. In addition to the various tint values of black, the line negative flat should also be labeled black.		
11. You might discover while making your hand-cut negatives that one or more flats are the same for more than one color. If so, use the same flat and label accordingly. Remember though, each color will require a different screen angle.		
12. When laying in your screen tints, measure the screen angles accurately; be sure the screen emulsion will be down and against the proofing material or plate. Tack the screens down with tabs of easily removed masking tape.		
13. Using color-key, transfer key or some other color proofing system, make color proofs of your fake color job. Mount and mat the proofs for display.		
14. Another way to do fake color is to cut overlays for each color and tint value on the art, and shoot each flat or overlay as a line negative.		

The student has satisfactorily completed the procedure "ASSEMBLING THE FILM FOR FAKE COLOR" according to the steps outlined.

Instructor's Signature
(Verifying Satisfactory Completion)

Date

LESSON PLAN: 21

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

SCOPE OF UNIT:

The process of assembling film images has traditionally been termed "stripping." This unit is concerned with modern film image assembly and the techniques, tools, equipment and materials used to accomplish this critical step in offset printing.

INFORMATION TOPIC: OR DEMONSTRATION: VIII-21

ALIGNING AND ASSEMBLING PROCESS COLOR NEGATIVES
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Strip a set of four-color negatives in register to a blue key.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. Clear film (mylar)
2. Vinyl masking sheets
3. Stripper's tools
4. White paper
5. Process negatives
6. Blue key flat
7. Register marks
8. Magnifier
9. Tissue diffusion sheet

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

INTRODUCTION:

One of the most common tasks performed by the film assembly technician is the stripping of process color. Although it is not a technically difficult process, it takes meticulous care and accuracy.

LESSON PLAN: 21

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

STEPS OF PROCEDURE:

1. Punch and pin four pieces of clear film and one sheet of vinyl masking. Clear film must be polyester (mylar) for dimensional stability.
2. Cut a window in the vinyl masking the size of the illustration to be stripped. Add to this flat any marks that may be necessary.
3. With the mylar on the pins, lay in one of the process negatives and tape corners with clear tape. This negative should be positioned by a layout drawn on white paper, the same layout used to cut the opening in the vinyl mask.
4. The negative stripped first in step 3 should be the one with a great deal of detail. (A blue key can be made of this negative to use as a stripping guide if desired.)
5. If positioning to a blue key (see step 4), it should be punched and pinned. Because a blue key is a light blue (transparent) film positive, it should be easy to position negatives to it.
6. Place the blue key positive on the pins, wrong reading. Place one sheet of mylar on the pins. Position one of the process negatives, wrong reading, to the blue key and tape with clear tape at the corners. Even though there may be register marks, the work should be checked for fit and register. Always strip and check color using a magnifier.
7. Repeat this process, (step 6), until all four process negatives are positioned, each on a separate piece of mylar.
8. If there is to be line work or other material in black or in other colors, it should be stripped into vinyl masking sheets to be double burned.
9. When plates or proofs are made, the common mask made in step 2 should be pin positioned with each color flat as it is burned.
10. It is recommended that process negatives not be stripped directly into vinyl masks. It is difficult to register these negatives and it is unlikely that all four windows can be cut exactly the same size.

11. If process negatives are to be positioned to each other rather than to a blue key flat, it is helpful to insert a lightweight tissue diffusion sheet between the negatives as you work. This allows you to differentiate between the two negatives as you look through the magnifier.

(INSTRUCTOR'S NOTE: If you wish students to strip process color, you may be able to get old sets of separations from a color printer. Old catalog jobs have an abundance of process color negatives that are obsolete.)

LESSON PLAN: 21

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

INTERACTION ITEMS:

1. What kind of clear film should be used for stripping process color? Why?
2. Which negative should be stripped first?
3. Why should process negatives not be stripped directly into vinyl masks?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 21

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT VIII : PERFORMING FILM IMAGE ASSEMBLY

EVALUATION ITEMS: NAME OF STUDENT: ____________________

ALIGNING AND ASSEMBLING PROCESS COLOR NEGATIVES

EQUIPMENT:

1. Clear film (mylar)
2. Vinyl masking sheets
3. Stripper's tools
4. White paper
5. Process negatives
6. Blue key flat
7. Register marks
8. Magnifier
9. Tissue diffusion sheet

DID THE STUDENT:	YES	NO
1. Punch and pin four pieces of clear film and one sheet of vinyl masking. Clear film must be polyester (mylar) for dimensional stability.		
2. Cut a window in the vinyl masking the size of the illustration to be stripped. Add to this flat any marks that may be necessary.		
3. With the mylar on the pins, lay in one of the process negatives and tape corners with clear tape. This negative should be positioned by a layout drawn on white paper, the same layout used to cut the opening in the vinyl mask.		
4. The negative stripped first in step 3 should be the one with a great deal of detail.		
5. If positioning to a blue key (see step 4), it should be punched and pinned.		
6. Place the blue key positive on the pins, wrong reading. Place one sheet of mylar on the pins. Position one of the process negatives, wrong reading, to the blue key and tape with clear tape at the corners. The work should be checked for fit and register.		

DID THE STUDENT:	YES	NO
7. Repeat this process, (step 6), until all four process negatives are positioned, each on a separate piece of mylar.		
8. If there is to be line work or other material in black or in other colors, it should be stripped into vinyl masking sheets to be double burned.		
9. When plates or proofs are made, the common mask made in step 2 should be pin positioned with each color flat as it is burned.		
10. It is recommended that process negatives not be stripped directly into vinyl masks.		
11. If process negatives are to be positioned to each other rather than to a blue key flat, it is helpful to insert a lightweight tissue diffusion sheet between the negatives as you work.		

The student has satisfactorily completed the procedure "ALIGNING AND ASSEMBLING PROCESS COLOR NEGATIVES" according to the steps outlined.

Instructor's Signature
(Verifying Satisfactory Completion)

Date

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IX : MAKING PROOFS

SCOPE OF UNIT:

This unit is concerned with prepress and press proofing of single-color, multicolor and full-color printing, both by photomechanical and ink-on-paper methods. Typographical proofing is covered in Unit III.

INFORMATION TOPIC: IX-1 OR DEMONSTRATION:

PREPRESS PROOFING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Define full-color press proofing and "progs."
2. Make a single-color sheet proof.
3. Make a multicolor overlay proof.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 10.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984, ch. 3, pp. 50-53; ch. 11, pp. 249-255.

Blair, Raymond N., ed. The Lithographer's Manual. 7th ed. Pittsburgh, PA: The Graphic Arts Technical Foundation, 1983, ch. 11.

INTRODUCTION:

Understanding the several ways to accomplish prepress and press proofing is essential to the complete understanding of the processes used in producing printed products. Proofs, as quality control devices, have become the single most important way to ensure that the customer receives the quality and accuracy that is expected.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IX: PERFORMING FILM IMAGE ASSEMBLY

OUTLINE: (Key Points)

I. Proofing - Purpose and Types

Modern typesetting devices are equipped with proofreading and editing terminals. Laser copiers interfaced directly with the typesetter can provide a quick, inexpensive hard copy proof. Programs for merging, proofreading, punctuation and spelling are now in everyday use. The old days of "galley proofs" and "proof presses" are gone, but the importance of accuracy and being able to see it before it's printed has increased today. With the growing popularity of expensive color printing, it is more critical than ever that mistakes are caught and corrected before they are printed. This unit is concerned with prepress proofing and press proofing of color separations. Proofreading and techniques of proofing, marking, and correcting typographical errors are covered in Unit III: Typesetting.

- A. Purpose of proofing
  - 1. For production control and internal plant use
    - a. Proofing for register
    - b. Proofing for color
  - 2. For customer approval and other external uses
    - a. Proofing for register
    - b. Proofing for color
  - 3. For quality - a very subjective term used by printer and customer alike, but seldom meaning the same to both
  - 4. For accuracy - a term that can be clearly defined and can carry a definite meaning to all
    - a. Accuracy of assembled material
      - (1) Completeness
      - (2) Size

b. Accuracy of position - regarding one color to another

c. Accuracy of imposition

(1) Back-up

(2) Margins

(3) Page position on sheet

(4) Trims

(5) Shingling

d. Accuracy of register

(1) Internal register

(2) Fit

B. Types of proofing - single color and multicolor

1. Photomechanical methods - off-press

a. Blueprint papers - blue image on white paper

(1) Exposed from negatives by UV contact

(2) Water developed

(3) Air dried

(4) Not dimensionally stable

(5) Will fade

(6) Inexpensive - easy to make

(7) Good for simple jobs - single-color

(a) Check accuracy of assembled material

(b) Check accuracy of position

(c) Check accuracy of imposition

b. Brownprint papers - brown image on dirty gray or tan background; these papers are also called Van Dyke, solar, silver print, print out paper (POP), developing out papers

(1) Longer exposure, darker image

(2) Makes positive image from negative

(3) Exposed to high intensity UV by contact

(4) Water developed; fixed with photographic fixer; rinsed in water.

(5) Air dried

(6) Not dimensionally stable

(7) Good for simple one and two-color jobs

  (a) Check accuracy of assembled material

  (b) Check accuracy of position

  (c) Check accuracy of imposition

  (d) Check register and fit by double burning both colors on same proof with different exposure times; provides light and dark brown image

c. Diazo papers - blue or black image on white paper; these papers are also called Ozairds™ (Ozalid Co.), white prints, bluelines, ammonia, prints, gas prints

(1) Exposed from positive - gives positive image

(2) Exposed from high intensity UV by contact

(3) Usually developed by ammonia fumes

(4) Are dimensionally stable - they stay dry

(5) Good for simple one-color jobs

  (a) Check accuracy of assembled material

  (b) Check accuracy of position

  (c) Check accuracy of imposition

(6) Accuracy of register may be checked on jobs with film positives by superimposing one positive over the other with a sheet of light tissue

between; working on a light table is helpful; Diazo proofs are not appropriate for this purpose

d. Dylux™ (Dupont) - blue image on light yellow background

  (1) Exposed by contact to high intensity UV

  (2) Both positive and negative working available

  (3) Longer exposures make image darker

  (4) No development required; changes color from exposure only

  (5) Good for one or two-color jobs

    (a) Check accuracy of assembled materials

    (b) Check accuracy of position

    (c) Check accuracy of imposition

    (d) Check register and fit by differential exposures of both colors on one proof

e. Diffusion transfer reflex (PMT™ - Kodak)

  (1) Used to proof small paste-ups

  (2) Not very practical or cost effective with modern electrostatic copiers

f. Diffusion transfer material

  (1) Contact negative paper to film positive in low intensity, point-source light (Handle under safelights.)

  (2) Positive camera quality print results

  (3) Good for single-color jobs

    (a) Check quality

    (b) Check accuracy

  (4) Faithful reproduction of halftones

  (5) High cost, comparatively

(6) Processed in diffusion transfer processor (Details of diffusion transfer process are covered in Unit V.)

g. Photographic paper

(1) Contact film negatives to paper under low intensity, point-source light (Handle under safelights.)

(2) Positive camera quality print results

(3) Good for single-color jobs

(a) Check quality

(b) Check accuracy

(4) Faithful reproduction of halftones

(5) High comparative cost

(6) Conventional processing or stabilization (See more information on photographic and stabilization papers in Unit V.)

2. Photomechanical multicolor proofs

a. Function of multicolor proof

(1) Shows color; represents actual inks

(a) Blue

(b) Density

(c) Grayness

(2) Proof base represents actual substrate

(a) Surface texture

(b) Color

b. Deficiencies of photomechanical color proofing

(1) Doesn't record dot gain

(2) Doesn't record trapping

c. Overlay proofs

(1) Color Key™ (3M Company and others)

(2) Thin, transparent, light-sensitive films

(3) Each printer color (negative or positive) is exposed in turn to the film

(4) Film is processed giving a color transparency of that printer

(5) Films are then laid in register on a white base which represents the substrate

(6) Available in positive or negative acting

(7) Advantages

  (a) Functions as a progressive proof; each color can be seen individually or as a composite print

  (b) If one color needs changing, the proof can easily be updated

  (c) Does not require specialized equipment to produce

(8) Disadvantages

  (a) Reflections and refractions from several overlays distort the viewer's perception of color

  (b) The several layers of plastic cause the white background to appear gray

  (c) Difficult to interpret the actual appearance on press sheet

d. Single sheet proofs - use common base material for all colors

(1) Cromalin™ (Dupont); Transfer Key™ (3M Company)

  (a) Each color is exposed and developed, one at a time

  (b) All four colors are built upon a single base, much like an actual printing of process color

  (c) Uses variety of methods; may be lamination of photosensitive layer to substrate or transfer of photosensitive coating to plastic support

(2) Cromalin™ - (Dupont)

  (a) Colorless photopolymer film with protective covers is laminated to paper base (substrate)

  (b) Special laminator strips protective cover from film and laminates light sensitive-coating to base

  (c) Paper is exposed to first separation negative (or positive)

  (d) Protective layer is removed

  (e) Image areas are tacky and accept pigmented toning powder

  (f) Above process is repeated for each additional color

  (g) Advantages - single sheet proof; select base of actual printing material

  (h) Disadvantages - expensive; requires special equipment; slow.

(3) Transfer Key™ (3M Company)

  (a) Sheets of light-sensitive color layers transferred to base

  (b) Exposed to first separation

  (c) Processed like color-key

  (d) Temporary support stripped away

  (e) Process repeated for all other process colors

  (f) Advantages - less expensive; requires no special equipment

  (g) Disadvantages - requires special base which may or may not adequately represent actual substrate

3. Press Proofing with ink - single, multicolor jobs

   a. Proofing on proof presses

      (1) Proofing from intermediate proof plates

      (2) Proofing the production plates

      (3) Except for the production of progressive proofs of full color jobs, litho proof presses are not in wide use

   b. Preliminary proofing on production presses

      (1) Inspect actual ink color on actual paper to be used for production run

      (2) Obtain samples for advanced distribution

      (3) Allow testing by the printer of new materials or innovative methods

   c. Proofing as part of presswork

      (1) Press proofs are charged extra

      (2) Customer representative goes to plant to inspect first sheets of important run

4. Press proof - full-color; at one time the only way to check a four-color job was to make a set of press proofs called progressive proofs; ("progs") many still believe this is the most accurate way; high costs in press operation have, however, restricted this method to only the most critical of color jobs; new proofing methods (discussed above) have taken away much of this kind of proofing.

   a. Progressive proofs - "progs"

      (1) One sheet printed with each individual color

      (2) One sheet printed with every possible combination of each two colors

      (3) One sheet printed with every possible combination of each three colors

      (4) One sheet printed with every combination of all four colors (finished job)

b. Advantages

   (1) Progs can carry color bars and other quality control strips to guide press operator when running job

   (2) Progs may be printed on actual press, paper, ink and press operator of final job, thereby eliminating many variables inherent in other proofing systems

   (3) Each color can be viewed and analyzed individually for specific color corrections

c. Disadvantages

   (1) Very expensive

   (2) Very time consuming

   (3) Not necessary for about 99% of color work

II. Equipment and Tools for Proofing

   A. For the most part, the exposure equipment and tools as well as the quality control devices used for photomechanical proofing are the same as used for platemaking. In the discussion of proofing systems, when the phrase "needs no specialized equipment" appears, it means normal plate department equipment is required. (See Unit X for information on this equipment and exposure devices.) In some types of proofs, special equipment is needed. (See descriptions furnished by specific proof system manufacturers for this information.)

   B. Although special presses have been manufactured for the production of color proofs, most press proofing is done on production style presses in order to simulate the variations that will actually occur on the production run. (For more information about production litho presses, see Unit XI.)

III. Viewing Color Proofs - viewing of color proofs and comparison to originals is best done, for all practical purposes, in lighting with color temperature of 4500° K to 5400° K; viewing booths and fluorescent tubes rated at these standards are available

IV. Summary and Conclusion

    A. Proofing - purpose and types

    B. Equipment and tools for proofing

    C. Viewing color proofs

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IX : MAKING PROOFS

INTERACTION ITEMS:

1. Name three kinds of mistakes that could be detected from prepress proofs.

2. If you were a customer for a full color job, would you rather see photomechanical proofs or press proofs?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Pass around samples of several different kinds of proofs. Discuss the following:

    a) Advantages of each

    b) Disadvantages of each

    c) How they are made

    NOTE TO INSTRUCTOR: Collect samples of as many different kinds of proofs as possible. Most commercial printers will be happy to help you.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IX : MAKING PROOFS

EVALUATION ITEMS:

1. Describe "progs" or progressive proofs.

   a. Why are they used?

   b. Why don't we make them for all full-color jobs?

2. Name three kinds of single sheet proofs suitable for single-color jobs.

   a.

   b.

   c.

3. What are two-color proofing systems?

   a.

   b.

4. What would be a good method to proof a halftone to check it for quality?

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IX : MAKING PROOFS

ANSWERS TO EVALUATION ITEMS:

1. "Progs" or progressive proofs are proofs of full-color separations. Each color is proofed individually as well as in combination with each color.

    a. Progs show much more than a photo-mechanical proof; they show the pressman how to control the press variables.

    b. Progressive press proofs are very expensive to make and are not needed for all jobs.

2. a. Diazo

    b. Brown line

    c. Dylux™

3. a. Color-Key™

    b. Cromalin™

4. Diffusion transfer or high contrast stabilization photo paper will show in sharp black and white what the halftone will look like when printed.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IX : MAKING PROOFS

SCOPE OF UNIT:

This unit is concerned with prepress and press proofing of single-color, multicolor and full-color printing, both by photomechanical and ink-on-paper methods. Typographical proofing is covered in Unit III.

INFORMATION TOPIC: OR DEMONSTRATION: IX-2

MAKING SIMPLE COLOR-KEY PROOFS
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Expose, process and mount a set of color-key proofs.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Producing Color-Key Proofs
2. AS 1: Make Color-Key Proof
3. Color-key film
4. Black or goldenrod paper
5. Vacuum frame
6. Negative
7. Developing glass
8. Developer
9. Squeegee
10. Mounting board

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

REFERENCES:

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

Blair, Raymond N., ed. The Lithographer's Manual. 7th ed. Pittsburgh, PA: The Graphic Arts Technical Foundation, 1983.

INTRODUCTION:

Color-key proofs (3M brand or other similar brand) are the simplest of the multicolor film-type proofs available. Although the color rendition is not always accurate, the cost and simplicity of this system make it ideal for a school laboratory proofing system.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IX : MAKING PROOFS

NOTE: Color-key film is expensive. This exercise should be demonstrated first to ensure that a minimum of materials is wasted.

STEPS OF PROCEDURE:

1. Place color-key film emulsion side down on black or goldenrod paper in vacuum frame. Place negative in contact, emulsion side down on color-key. Turn on vacuum.
2. Expose. Make test to obtain correct exposure which will yield a 4 or 5 on a plate exposure guide.
3. Turn over color-key film emulsion up on developing glass. A wet glass will aid in keeping the film in position during processing.
4. Spread color-key developer on film and rub lightly with swab in a sweeping figure-8 motion to remove most unexposed material.
5. Reverse or change pad and continue to develop with slightly more pressure while forming tighter circles. This removes nonimage area of halftones, etc.
6. Rinse entire film completely.
7. Squeegee back side; blot dry on emulsion side. Emulsion will scratch easily.
8. Mount in flaps on white paper or board.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IX : MAKING PROOFS

INTERACTION ITEMS:

1. Discuss the various kinds of multicolor film-type proofs available. What are their advantages and disadvantages?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IX : MAKING PROOFS

EVALUATION ITEMS: NAME OF STUDENT:____________________

MAKING SIMPLE COLOR-KEY PROOFS

NOTE: Color-key film is expensive. This exercise should be demonstrated first to ensure that a minimum of materials is wasted.

EQUIPMENT:

1. Color-key film
2. Black or goldenrod paper
3. Vacuum frame
4. Negative
5. Developing glass
6. Developer
7. Squeegee
8. Mounting board

DID THE STUDENT:	YES	NO
1. Place color-key film emulsion side down on black or goldenrod paper in vacuum frame. Place negative in contact, emulsion side down on color-key. Turn on vacuum.		
2. Expose. Make test to obtain correct exposure which will yield a 4 or 5 on a plate exposure guide.		
3. Turn over color-key film emulsion up on developing glass.		
4. Spread color-key developer on film and rub lightly with swab in a sweeping figure-8 motion to remove most unexposed material.		
5. Reverse or change pad and continue to develop with slightly more pressure while forming tighter circles.		
6. Rinse entire film completely.		

DID THE STUDENT:	YES	NO
7. Squeegee back side; blot dry on emulsion side.		
8. Mount in flaps on white paper or board.		

The student has satisfactorily completed the procedure "MAKING SIMPLE COLOR-KEY PROOFS" according to the steps outlined.

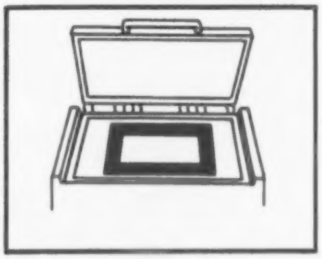
Instructor's Signature
(Verifying Satisfactory Completion)

Date

HO 1

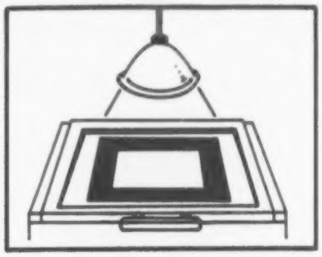
Producing Color-Key Proofs

1



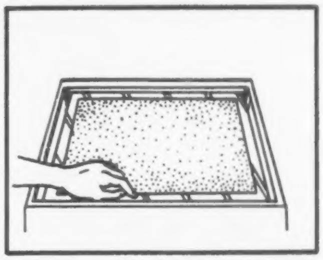
Place color-key film emulsion side down on black or goldenrod paper in vacuum frame. Place negative in contact emulsion side down on top of color-key. Turn on vacuum.

2



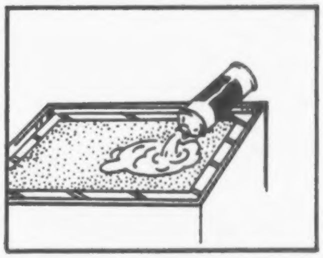
Expose to 4 or 5 on plate guide.

3



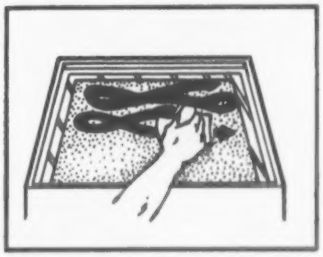
Turn over (emulsion side up) color-key on developing glass.

4



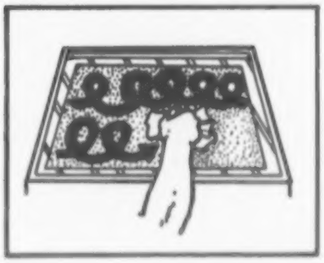
Pour negative color-key developer on developing pad and color-key film; spread evenly over surface.

5



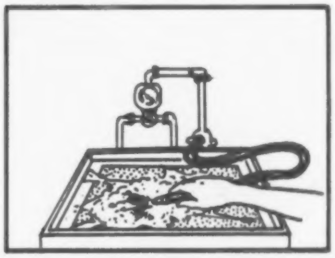
Develop with light motion of pad to remove most background.

6



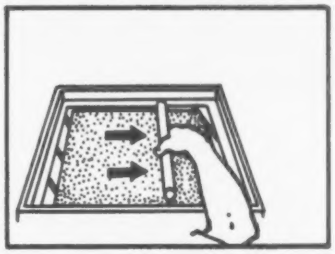
Reverse side of pad and continue developing with firmer pressure in tight circular motion.

7



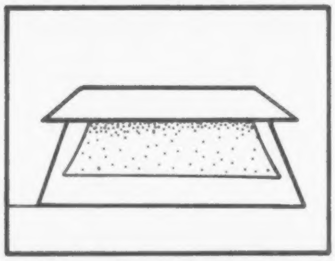
Rinse both sides thoroughly.

8



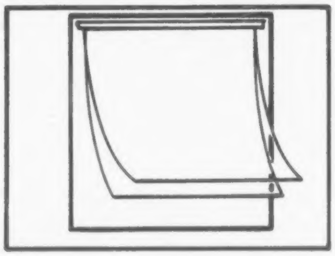
Squeegee uncoated side.

9



Blot dry between newsprint or paper towels.

10



Mount overlays in register on piece of white index or other heavy paper or cardboard. Hinge each cell with clear tape.

ASSIGNMENT SHEET 1 - MAKE COLOR-KEY PROOF

1. Expose and process a two-color set of color-key proofs from negatives furnished by your instructor. Mount these neatly and in *exact* register on a piece of white index or illustration board.
   a. Why couldn't we make a brown-line proof of these negatives?
   b. What does a color-key proof show that a single-sheet proof doesn't?

NOTE TO INSTRUCTOR: Provide the student with negatives for a two-color job. Thes should have some close registeration on them.

ANSWER TO ASSIGNMENT SHEET 1 - MAKE COLOR-KEY PROOF

The instructor should evaluate this assignment sheet on an individual basis; check proofs to see if they are mounted neatly in exact register.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IX : MAKING PROOFS

SCOPE OF UNIT:

This unit is concerned with prepress and press proofing of single-color, multicolor and full-color printing, both by photo-mechanical and ink-on-paper methods. Typographical proofing is covered in Unit III.

INFORMATION TOPIC: OR DEMONSTRATION: IX-3

MAKING BROWN LINE PROOFS
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Expose, process and assemble a brown line proof.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Producing Brown Line Proofs
2. AS 1: Make Brown Line Proof
3. Brown line paper
4. Negative
5. Vacuum exposure unit (platemaker)
6. Water
7. Cotton wipe
8. Photographic fixer
9. Squeegee

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. *Printing Technology*. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

REFERENCES:

Peck, Harold L. *Stripping: The Assembly of Film Images*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

Blair, Raymond N., ed. *The Lithographer's Manual*. 7th ed. Pittsburgh, PA: The Graphic Arts Technical Foundation, 1983.

INTRODUCTION:

Brown line proofs are typically used in industry to present assembled proofs to the customer. They are used to check such things as imposition, sequencing of pages, halftone positions, etc. They are not of suitable quality to examine halftone quality or color register. They are not normally used for a reader's typographical proofing either.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IX : MAKING PROOFS

NOTE TO INSTRUCTOR: Brown line paper is relatively inexpensive and easy to use. Caution should be used in handling the fixer.

STEPS OF PROCEDURE: (HO 1)

1. Position negative flat emulsion side down on top of brown line paper. Place in vacuum exposure unit (platemaker). Turn on vacuum.
2. Expose. You may wish to experiment to determine the exposure time that produces the desired darkness of image.
3. Remove exposed proof from exposure unit and place in plate sink emulsion side up.
4. Develop with water. Use cotton or plate wipe to swab.
5. Fix image with photographic fixer. Swab for about 30 seconds.
6. Rinse with water.
7. Squeegee dry.
8. Hang up to dry completely.
9. Fold the proof (assemble it) if it is a brochure, booklet, etc. Make a customer presentation.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IX : MAKING PROOFS

INTERACTION ITEMS:

1. What are brown line proofs? Why are they used? When are they not used?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT IX : MAKING PROOFS

EVALUATION ITEMS: NAME OF STUDENT: ____________________

MAKING BROWN LINE PROOFS

EQUIPMENT:

1. Brown line paper
2. Negative
3. Vacuum exposure unit (platemaker)
4. Water
5. Cotton wipe
6. Photographic fixer
7. Squeegee

DID THE STUDENT:	YES	NO
1. Position negative flat emulsion side down on top of brown line paper. Place in vacuum exposure unit (platemaker). Turn on vacuum.		
2. Expose. Experiment to determine the exposure time that produces the desired darkness of image.		
3. Remove exposed proof from exposure unit and place in plate sink emulsion side up.		
4. Develop with water. Use cotton or plate wipe to swab.		
5. Fix image with photographic fixer. Swab for about 30 seconds.		
6. Rinse with water.		
7. Squeegee dry.		
8. Hang up to dry completely.		
9. Fold the proof (assemble it) if it is a brochure, booklet, etc. Make a customer presentation.		

The student has satisfactorily completed the procedure "MAKING BROWN LINE PROOFS" according to the steps outlined.

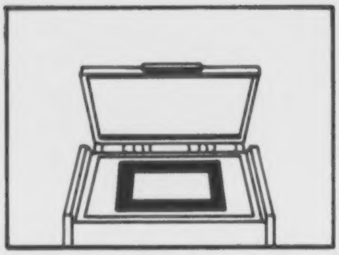
Instructor's Signature
(Verifying Satisfactory Completion)

Date

HO 1

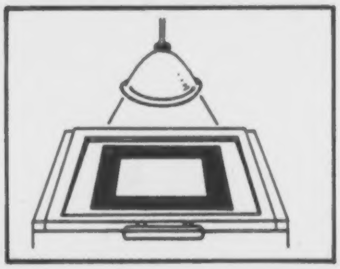
Producing Brown-Line Proofs

1



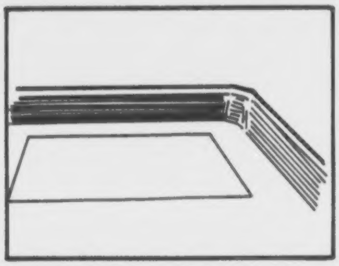
Position negative flat emulsion side down on top of brown-line paper. Place in vacuum frame exposure unit. Turn on vacuum.

2



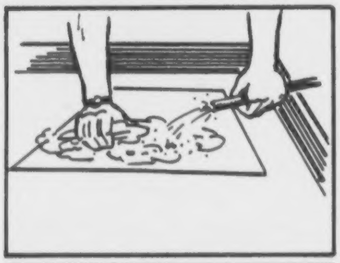
Expose. Length of exposure time determines how dark the image becomes. Experiment.

3



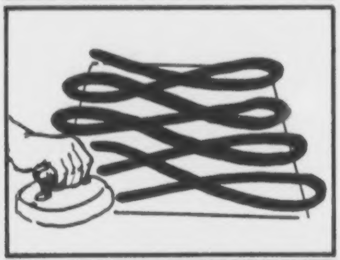
Remove exposed brown-line paper and place in plate sink emulsion side up.

4



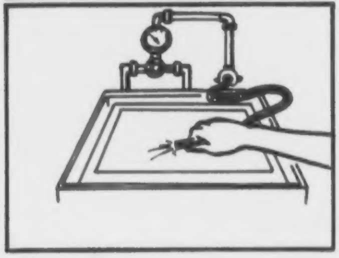
Develop with water. Use swab lightly to ensure complete development.

5



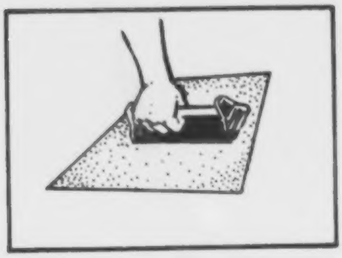
Fix image with photographic fixer. Swab for 30 seconds.

6



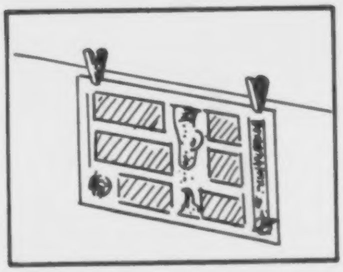
Rinse with water.

7



Squeegee dry.

8



Hang to dry.

ASSIGNMENT SHEET 1 - MAKE BROWN-LINE PROOF

1. Expose and process a brown-line proof of a negative flat furnished by your instructor. Dry it and fold it into a signature.
    a. Is the imposition correct?
    b. Is the position correct?

    NOTE TO INSTRUCTOR: Have available a flat of a booklet signature. Make one page upside down or switch the position of two pages in order to check the alertness of the student.

ANSWERS TO ASSIGNMENT SHEET 1 - MAKE BROWN-LINE PROOF

The instructor should evaluate this assignment sheet on an individual basis according to the following criteria:

1. Student produced the proof with proper position.
2. Student produced the proof with proper imposition.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT X : IMAGE CARRIERS

SCOPE OF UNIT:

This unit provides basic, broad and general information about offset litho image carriers. It explores a wide variety of image carrying devices and then zeroes in on the making of additive and subtractive plates.

INFORMATION TOPIC: X-1 OR DEMONSTRATION:

MAKING PLATES

(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Describe the purpose of the offset plate.
2. Match terms related to processing plates to correct definitions.
3. List eight safety rules to be adhered to when processing plates.
4. Identify the differences in exposure of additive and subtractive plates.
5. Given the manufacturer's recommended exposure time, produce a solid step on the platemaker's guide; test exposure time and the step produced; determine the corrected exposure time.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. TM 1: Diffusion Transfer Platemaking
2. TM 2: Camera-Direct Platemaking
3. TM 3: Laser Imaging
4. TM 4: Electrostatic Platemaking (Camera-Direct)
5. TM 5: Plate End Styles

6. TM 6: Exposing Plates in Vacuum Frame
7. HO 1: Quality Control Devices
8. HO 2: Safety Tips

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 12.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch. 14.

REFERENCES:

Blair, Raymond N., ed. The Lithographer's Manual. 7th ed. Pittsburgh, PA: The Graphic Arts Technical Foundation, 1983, ch. 10.

INTRODUCTION:

The image carrier of today's lithographic printing industry is a far cry from the litho stone of 18th century Bavaria as developed by Senefelder, yet the principle of the process remains the same. It is still necessary to produce a plate with an ink-receptive image area and a nonimage area that repels the ink. Today, the plate is made in a highly controlled factory atmosphere with sophisticated quality control devices monitoring every step. This controlled quality is essential in the production of the modern printing we take for granted today.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT X : IMAGE CARRIERS

OUTLINE: (Key Points)

I. Purpose and Theory of the Offset Lithography Plate

    A. Water-repelling image

    B. Greasy image

    C. Nonimage's high affinity for water

    D. The purpose of the offset plate is to provide the image that will be transferred to the blanket (offset) cylinder, which in turn will transfer to the substrate.

II. Types of Plates

    A. Direct - image applied directly to plate from positive copy

        1. Photo direct - projection plates

            a. Diffusion transfer

            b. Photo imaging - silver

                (1) 3M™ direct image camera platemaker

                (2) Itek™ direct camera platemaker

                (3) 3M Onyx™

        2. Electrostatic plates

            a. Bruneing™

            b. A.B. Dick™

            c. 3M™

            d. Others

        3. Duplicating paper master

            a. Type image with carbon ribbon

            b. Draw/write image with litho pencil

c. Laser imaged plates

B. Indirect - image applied by a photo conversion of the positive image to a film positive or negative

1. Presensitized

a. Additive

(1) Positive working

(2) Negative working

b. Subtractive

(1) Positive working

(2) Negative working

c. Aqua: Due to ecological concern over waste water and chemical contamination, most plate manufacturers are now offering a "water washout" plate. It is predicted that in a relatively short time, all litho plates will be "ecologically safe." The principles that make these plates work and the procedure for exposing and processing these plates remains essentially the same.

2. Shop-coated plates

a. Wipe-on

b. Whirler-coated

c. Multimetal, bimetal, trimetal, deep etch, etc.

C. Types of plates - status and purpose in industry

1. Direct - direct image plates have, for the most part, been limited to short-run jobs printed on small presses and duplicators. Some notable exceptions to this are the 3M Onyx™ plate and electronic plates imaged by lasers.

a. Photo direct plates are made by projecting an image through a lens.

(1) Diffusion transfer - made in ordinary process camera and processed in an ordinary diffusion transfer processor. This plate is made the same way a diffusion transfer print is made.

Example: Kodak PMT™ plate (TM 1)

(2) Itek™ or 3M™ direct image camera platemaker systems use a modified vertical camera with in-line processing. The reflective copy (paste-up) is placed on a lighted copyboard, a reversing lens projects the image onto roll-plate material and an exposure is made. The plate material is cut to the proper press size and is automatically processed. This camera has several possible pre-set enlargements and reductions. (TM 2)

(3) 3M Onyx™ brand plate material is based on a polyester material and comes in sheets suitable for larger presses as well as duplicators. It is a projection speed material; size is limited by camera size. Material may be processed in plate processor.

b. Laser imaged plates - not necessarily a special plate, but a special method of exposing. May use any one of several compatible, conventional presensitized plates.

(1) Scanned paste-ups - scanner reads paste-up (including illustrations) and then electronically/digitally transmits image to laser exposure unit. Scanner may be at same location as laser or may be in another location and transmit the digital signal by satellite.

(2) Direct from captured electronic data - a recent innovation, largely experimental but in limited-use production; has the ability to transmit electronic data directly to the plate. Electronically stored computer data, such as typesetting disks or CAD disks, can be transmitted directly to the laser platemaker. In this case, the first "hard copy" produced in the job is the image carrier or plate. This process, from the start of transmission to the finished processed plate, can take less than 10 minutes and is currently being used for the production of critical, sensitive government documents that have very close deadlines.

(3) Processing of laser imaged plates is conventional. (TM 3)

c. Electrostatic plates - electrostatic plates and platemaking equipment are made by several manufacturers

(1) The 3M™ direct image camera platemaker also has the ability to make an electrostatic plate as well as a direct photo plate. This plate material is called ESP (electrostatic plate).

(2) Essentially, most other electrostatic platemakers use a machine that is similar to an ordinary office copier. The electrostatic process is the same. (TM 4)

d. Duplicator (paper master) - these are smooth paper or plastic plates with water-receptive surfaces which are limited to small duplicator sizes. They are used for short runs (less than 100 copies) and are imaged with any ink-receptive material such as carbon ribbon typewriter, some ballpoints or pencils or a specially produced litho pencil. They require no processing, although it is usually necessary to pre-etch (dampen) them.

2. Indirect - indirectly imaged plates are the standard of the industry and are, for the most part, made of grained (roughened) aluminum. They are the typical plate used for sheet-fed or web-fed presses printing commercial publications or newspapers, and generally have the versatility to produce all work from simple black and white to full-color close register.

a. Shop-coated plates - these plates, with the exception of wipe-ons, are virtually nonexistent in today's printing industry

(1) Advanced technology in presensitized products has, for the most part, eliminated the need for shop-coated plates much in the same way that George Eastman made the old wet plate obsolete in photography.

INSTRUCTOR NOTE: For complete information on shop-coated plates such as albumin, casein, deep etch, copperized deep etch, bichromate plates, bimetal and trimetal plates, see The Lithographer's Manual, chapter 10.

(2) Wipe-on plates - many printing companies, particularly those involved in quick turn-around work such as newspapers, use wipe-on plates

(a) Coating - diazo coating mixed and wiped on with lintless litho wipe

(b) Exposure - same as presensitized plate from negative

(c) Processing - same as a one-step additive-negative plate; by hand or in automatic processor

(d) Plate metal - grained (brush, ball or sandblasted) aluminum

b. Presensitized plates

(1) History - first presensitized plates were test marketed in late 1940's, but did not become industry standard until late 1950's and early 1960's. Shop-coated plates were still in wide use in certain parts of the country in 1970. Factory-sensitized plates today are the standard of the printing industry. High cost of labor in the print shop and better consistency of quality of mass-produced plates make the technical choice of presensitized plates the wise choice.

(2) Sizes - presensitized plates are manufactured by a number of different companies in a variety of sizes for nearly any press in the world. Typical thicknesses range from about .005" to about .015" for the larger presses.

(3) End shapes - (This information pertains to all plates.) (TM 5)

(a) Straight-edge plates are by far the most common for offset presses other than duplicators. The straight-edge is clamped at each edge and pulled tight by a stretching device on the press.

(b) Pin bar edge - plates have a series of holes punched along each edge of the plate. These holes fit on a series of pins on the press called the pin bar.

(c) Slotted edge - plates have elongated holes along each edge that fit elongated hooks on the press

(d) Serrated - also with elongated holes

(4) Exposure master type - positive or negative

(a) Negative plates are exposed from a film negative. Light passing through the clear areas of the negative "harden" (make nonsoluble) the light-sensitive coating. Processing removes nonimage areas.

(b) Positive plates are exposed from a film positive. Unexposed (image) areas remain ink-receptive; processing removes the exposed (nonimage) areas.

(c) Advantages and disadvantages

- Negative plates tend, in the long run, to be less expensive because the negatives are the direct product of the camera.
- Negative plates are quicker to process and take fewer chemicals.
- Negatives are quicker and easier to clean and retouch to remove dirt and scratches.
- Negative plates may require several exposures to "burn in" everything on the plate.
- Positives require only one exposure, making them quicker to expose.

- It is easier to check register and catch mistakes with positives.
- Positives must be made from negatives, thereby taking additional time to prepare.
- Remakes of positive plates are faster, which causes less press down-time.

(5) Additive vs. subtractive plates- additive and subtractive plates are exposed in the same way, difference is how they are processed.

(a) Additive - diazo coating is hardened (made nonsoluble) by light exposure. This image area is coated with ink-receptive lacquer to ADD the image in processing.

(b) Subtractive - light-sensitive coating on a subtractive plate is the image. Portions of this coating (image) are hardened (made nonsoluble) and the non-image area of the coating is removed or SUBTRACTED.

(c) Most quality presensitized surface plates made today are of the subtractive type. Although slightly higher in cost, the quality maintained by the factory-applied image coating is better, they are quicker and easier to process, and they can be made ecologically safe.

III. Processing Plates

A. Processing presensitized plates

Many presensitized plates are manufactured with a light-sensitive coating on both sides. Although some manufacturers do not guarantee both sides, many printers use both sides of the plate. Some printers contend that the chances of scratching the second side of the plate are so great and the costs from potential press down-time so high that the small saving gained by using both sides of the plate is not worth it. Each company will need to decide for itself.

B. Processing additive plates (See lesson 2 of this unit.)

C. Purposes of additive processing chemicals

   1. Desensitizer gum - removes the unexposed areas of light-sensitive coating. Exposing the light-sensitive diazo coating makes it insoluble.

   2. Developer - this developing lacquer could be replaced by litho ink. It makes the image visible and tough and is water-repellent.

   3. Gum arabic - a water soluble gum solution that will adhere only to the nonimage area and protect the aluminum surface from oxidizing. (Oxidized aluminum is ink-receptive.) Gum should be buffed until dry to prevent it from sticking to image area.

D. Processing subtractive plates (See lesson 3 of this unit.)

E. Purpose of subtractive processing chemicals

   1. Developer is an alcohol based chemical that dissolves the unexposed coating. This must be removed completely from the plate because it contains very small particles of dissolved coating, and if allowed to dry on the plate would be sensitive to ink.

   2. Gum arabic is a water soluble gum solution that will adhere only to the nonimage area and protect the aluminum surface from oxidizing. (Oxidized aluminum is ink-sensitive.) Gum should be buffed until dry to prevent it from sticking to the image.

F. Plate chemicals

   1. Gum arabic comes from the acacia tree. Any gum allowed to stick to the image is water receptive and repels ink. This area is said to be "blind."

   2. Asphaltum gum - used over entire plate after printing. Asphalt replaces the ink on the image and maintains a greasy, ink-receptive surface while the gum protects the nonimage area from oxidation.

3. Developing inks - nondrying inks used to rub up an additive plate rather than lacquer

4. Lacquers - used to strengthen image and make it resistant to solvents, acids and gum

5. Lacquer emulsion - mixture of gum and lacquer to provide a one-step processing system for additive plates

6. Plate tusche - used to add image area to a plate

7. Image remover - solvent for removing image areas or dirt spots on a plate

8. In addition to the above standard chemicals, most presensitized plate manufacturers have a variety of chemicals such as desensitizer, plate cleaner, scratch remover, plate saver, etc.

9. Rubber (snake slips) and stone hones are available to physically "erase" the image from a plate.

G. Platemaking equipment

1. Exposure equipment

a. Light sources

(1) High in UV (ultraviolet)

(2) Carbon arc

(3) Mercury vapor

(4) Metal halide

(5) Quartz iodine

(6) Pulsed xenon

(7) Each of the above light sources has its advocates and each provides a different kind of light. The plate manufacturer should be consulted to determine which light source is best suited to the plate.

(8) Integrators - most of the above light sources can be used with light integrators. Light integrators will compensate for variables or changes in the light source. Instead of measuring exposures in time, it measures units of

light. Integrators continually monitor the amount of light falling on the plate and adjust the length or intensity accordingly. Some factors which cause exposure times to change are:

- (a) Voltage fluctuations
- (b) Age of bulbs
- (c) Deterioration of lamp reflectors
- (d) Distance of lamp to plate, etc.

b. Platemaking devices - devices that maintain very uniform and tight contact between the negative (or positive) and plate. A vacuum contact frame is usually used for this purpose, although pressure contact frames are sometimes used for small duplicator plates. A second component of the platemaking device is the exposure unit. These two components or units may or may not be integrated into a single machine. There are advantages and disadvantages of each.

- (1) Single unit style (such as the nuArc™ "flip-top" exposure unit)
  - (a) Takes less floor space
  - (b) Costs more
  - (c) Replacement requires purchase of both light and contact frame.
  - (d) Safer - less light leak
  - (e) Easy to maintain light-to-plate distance
  - (f) Light-to-plate distance is not adjustable.
  - (g) Must change entire machine to change light source
- (2) Two-unit exposure device - has separate exposure light from vacuum frame
  - (a) More practical for large plates
  - (b) Can have multiple light sources for one contact frame

(c) Requires more floor space

(d) May cost less for comparable size

(e) Difficult to protect operator from UV exposure

(f) Light-to-plate distance adjustable, but can be moved accidentally

(3) The contact frame will squeeze the negative and plate together between the glass and the rubber pressure blanket when the air between the glass and blanket are extracted by vacuum pump. (TM 6)

(4) "Option X™" vacuum frame - traditional vacuum frames may "seal-in" air and cause spaces between negative flat and plate. Space between the negative and plate may cause light spreading (diffusion). Diffusion will cause the image to be bolder in this area. The Douthitt Corp. has developed and patented a vacuum frame which they call "Option X™." This new frame is purported to eliminate air-trap diffusion because the airseal starts in the center and moves outward pushing the air out before it. This is a good step forward for very large vacuum frames which have been plagued by air-trap diffusion.

(5) Step and repeat devices - also called photocomposing machines; the purpose of the step and repeat machine is to expose multiple images in exact position on the printing plate. Traditionally, step and repeat machines have been used to expose multiple small images onto a plate, such as a job for printing labels. More and more, however, as technology advances, they are capable of positioning a variety of different images onto the plate and eliminate film assembly. They are, in reality, automatic film assembly machines.

(a) Pin register system - hand-stepping using system such as Rayden C™

- Accurate

- Very slow
- Inexpensive

(b) Vertical (such as Rutherford™) or horizontal (such as Misomex™); negative is mounted (locked up) in chase which then is accurately moved by screwdriver from position to position

- Relatively fast
- Accurate
- Expensive

(c) Automatic and/or computerized step and repeat - several companies (such as Misomex™) produce numerically controlled and/or computer controlled step and repeat devices. These are:

- Very expensive
- Very fast
- Very accurate

These machines are capable of being programmed to expose a variety of types and sizes of negatives in very accurate positions on the plate. These are increasingly being used by magazine and book manufacturers as pagination devices.

2. Processing equipment

   a. Plate sinks - usually flat, shallow sinks with sloping surface in which plates may be placed and processed by hand. Running water greatly assists in processing and cleanliness of the plate department.

   b. Rub-up plate table - may be simply a countertop or a table made especially for plate making; manufactured equipment may include heated air drying, shelves, storage cabinets and convenient roll of paper. This roll of paper may be spread out to provide a surface on which the plate is processed.

c. Plate racks - plates should be hung in a vertical position to dry. They should not touch and they should be in a dust-free area. Manufactured racks and cabinets are available for this purpose.

d. Automatic processors - mechanized plate processors are available for volume users of presensitized plates. They consist of a series of rollers and brushes that function in much the same way a worker does when processing a plate by hand. The plate is fed in one side and comes out through a heated dryer on the other side press ready. Processing time from dry to dry is 2 to 5 minutes. This is a particularly valuable machine for large volume users of large size plates.

e. Plate crimper - considered by some to be press equipment; this is the tool that bends each edge of the finished plate to make it fit the web-press cylinder

H. Quality Control Devices (HO 1)

1. To determine exposure

a. 21-step platemaker's guide

b. 10-step platemaker's guide

c. In order to determine proper exposure for presensitized plates:

(1) Read manufacturer's instructions packaged with plates. Instruction sheet will recommend a trial exposure time and a step on the platemaker's guide that indicates proper exposure.

(2) Place negative (or positive) over plate in platemaker.

(3) Place platemaker's guide (either 10-step or 21-step) on the edge of the plate with clear film over it.

(4) Evacuate air and wait approximately one minute.

(5) Make trial exposure as recommended by

manufacturer.

(6) Process plate normally. Be sure to include the plate guide image in your processing, but do not give it extra attention. The goal is to process the plate guide image in exactly the same way as the rest of the plate.

(7) Examine the plate guide image. Each step represents either a doubling or halving of the exposure time.

(8) For example, if the instructions indicate that a solid step 6 is the indicator of a proper exposure, and the test exposure develops to a step 8, the exposure must be cut in half to achieve the correct time.

2. Other quality control devices for plates

a. GATF star targets - target images that are exposed to plates and processed with the plate

(1) If center of target appears filled on the plate, dot spread is indicated.

(2) If center of target appears broken or enlarged, dot sharpening has occurred.

b. GATF dot gain scale - a signal strip of graduated screened numbers on a screened background

(1) The number that disappears indicates a dot size change.

(2) Comparing this number on the plate to the number that actually prints will measure the amount of dot gain on the press.

(3) This dot gain scale will also indicate when the gain is caused by a slur.

c. There are several commercial platemaking quality control devices on the market. Each, when used properly, can aid in a real improvement of plate quality.

NOTE: (concerning exposure) Many negative plates will require multiple exposures to accommodate overprints, reverses, screen tints, halftones, etc. Exposures are cumulative, and where these exposures fall on top of each other, the plate is overexposed. In most cases this is not critical, but could result in an image spread. In addition, some masking sheets do not totally block out all UV light. Because of this, some overall exposure may occur and build up (accumulate) to the critical point in some cases.

IV. Safety in Platemaking (HO 2)

A. Chemical safety - many dangerous chemicals that used to be associated with the making of litho plates have been eliminated. Most notable of these are the bichromates and metal compounds that could cause toxic skin and blood reactions. Plate making chemicals still demand care and respect by observing safety rules while using them.

1. Do not breathe fumes of chemicals. Work in a well ventilated area.
2. Avoid skin contact with chemicals. Wash skin immediately when contact is made.
3. Wear safety goggles to avoid splashing chemicals in the eyes.
4. Always open cans and bottles of chemicals with the top pointing away from your face.
5. Wear protective clothing. Do not carry chemical residue out of the lab on your clothes.
6. Throw all used plate wipes and cotton swabs away after use.
7. Do not attempt to operate plate exposure equipment and automatic processing equipment with wet hands.
8. Use only chemicals called for by the manufacturer.
9. Follow directions on chemical containers.
10. Always shake chemicals before using.
11. Close all containers tightly when not in use.
12. Keep chemicals from extreme temperatures (both heat and cold).

B. Other safety tips

1. UV light can cause permanent damage to your eyes if you look at it. Avoid looking directly at the light.

2. Carbon arc fumes are dangerous to breathe and will, if present with certain chemical solvents, cause toxic gasses which may be fatal. Do not operate carbon arcs near any chemical degreaser or solvent.

3. Aluminum plates have sharp edges. Always protect your hands when handling plates. Drying your hands thoroughly and applying a hand cream will keep you hands soft and less susceptible to cuts.

V. Summary and Conclusion

A. Purpose and theory of the offset lithography plate

B. Types of plates

C. Processing plates

D. Safety in platemaking

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT X : IMAGE CARRIERS

INTERACTION ITEMS:

1. Why are offset litho plates right reading and not backwards like a rubber stamp?

2. Why are most of the plates we use today coated at the factory instead of in our own shop?

3. Name some procedures we use to make plates that ensure that we get consistent quality.

4. Can you name some safety rules for the plate room other than those mentioned in class?

5. Why do we use a yellow lighted work area for plates?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. As a class project develop a safety wall chart. Use the safety tip handout (HO 2) and have students illustrate each one using clip art. An alternative would be to have each student make a safety poster using one of the safety tips from HO 2.

2. Have students process a small partial, pre-exposed plate. (Pre-expose small pieces of inexpensive additive plates.) These images may be small plaques or mottoes (like fortune cookies) in order to generate more interest. The student should be observed processing these plates in order to ensure that the procedure is mastered before a large plate is attempted. This assignment may be repeated with other types of plates.

3. Have students expose a dummy plate requiring multiple burns. Cut cardboard the size of plates and have each student simulate exposing a plate with more than one exposure. Use the pin register system. Observe each student in this process to ensure that the procedure is mastered before a real plate is attempted.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT X : IMAGE CARRIERS

EVALUATION ITEMS:

Match the following terms to correct definitions.

____ 1. Desensitizer

____ 2. Platemaker's guide

____ 3. Gum arabic

____ 4. Developing lacquer

____ 5. Cheesecloth

____ 6. Flat-sensitive plate

____ 7. Burn

____ 8. Subtractive plate

____ 9. Positive plate

____10. Additive plate

a. A water soluble chemical used to protect the non-image area of the plate from oxidation

b. A negative or negatives positioned on a masking sheet for use in exposing a plate

c. A plate made from positives

d. Expose to very bright, high-intensity UV light

e. A chemical that removes the unexposed light-sensitive plate coating

f. A chemical that adheres to the image of the plate during processing and will repel water

g. A plate which is manufactured with the image-bearing surface already on it; it is removed from the non-image area during processing

h. A soft, open weave material used to buff dry the gum on plates

i. A plate which is manufactured with light-sensitive coatings that will accept developing lacquers only in the exposed image areas during processing

j. A continuous tone step scale of 10 or 21 steps used to calibrate exposure times for plates

11. Describe the purpose of the offset plate.

12. List at least eight safety rules you should practice in the platemaking area.

    a.

    b.

    c.

    d.

    e.

    f.

    g.

    h.

13. Other than exposure time, what are the differences in exposing additive and subtractive plates?

14. If the manufacturer recommends exposure to produce a solid step 6 on the platemaker's guide for a negative plate, write the corrected exposure below.

Total Exposure Time	Step No. Produced	Corrected Exposure Time
3 min.	4	
5 min.	8	
1 min.	2	
4 min.	5	

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT X : IMAGE CARRIERS

ANSWERS TO EVALUATION ITEMS:

1. e
2. j
3. a
4. f
5. h
6. b
7. d
8. g
9. c
10. i

11. The purpose of the offset plate is to provide the image that will be transferred to the blanket (offset) cylinder, which in turn will transfer to the substrate.

12. The student may list any eight of the following:

    a. Do not breathe fumes of chemicals. Work in a well ventilated area.
    b. Avoid skin contact with chemicals. Wash skin immediately when contact is made.
    c. Wear safety goggles to avoid splashing chemicals in the eyes.
    d. Always open cans and bottles of chemicals with the top pointing away from your face.
    e. Wear protective clothing. Do not carry chemical residue out of the lab on your clothes.
    f. Throw all used plate wipes and cotton swabs away after use.
    g. Do not attempt to operate plate exposure equipment and automatic processing equipment with wet hands.
    h. Use only chemicals called for by manufacturer.
    i. Follow directions on chemical container.
    j. Always shake chemicals before using.
    k. Close all containers tightly when not in use.
    l. Keep chemicals from extreme temperatures (both heat and cold).
    m. UV light can cause permanent damage to your eyes if you look at it. Avoid looking directly at the light and protect your eyes.
    n. Carbon arc fumes are dangerous to breathe and will, if present with certain chemical solvents, cause toxic gasses which may be fatal. Do not operate carbon arcs near any chemical degreaser or solvent.

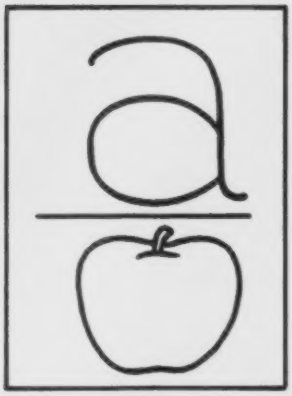
o. Aluminum plates have sharp edges. Always protect your hands when handling plates. Drying your hands thoroughly and applying a hand cream will keep your hands soft and less susceptible to cuts.

13. None

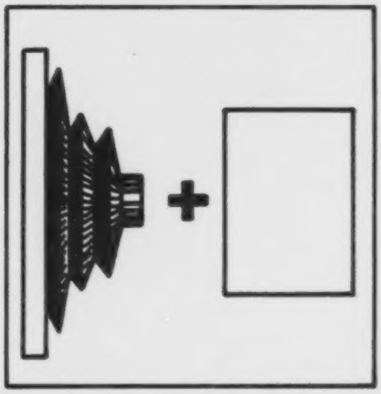
14. 6 minutes
2-1/2 minutes
4 minutes
5-6 minutes

TM 1

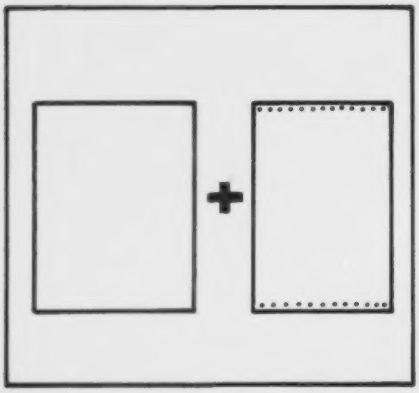
Diffusion Transfer Platemaking



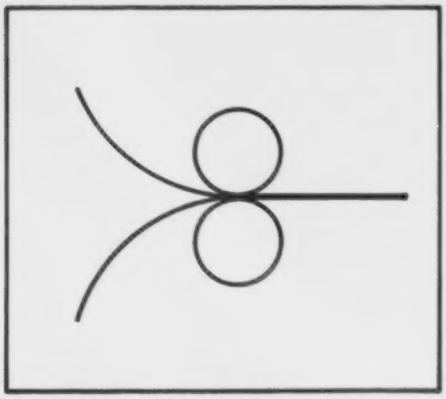
PASTE-UP



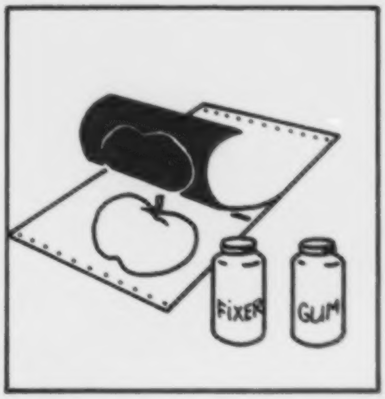
1 LOAD THE CAMERA WITH NEGATIVE PAPER AND EXPOSE IT.



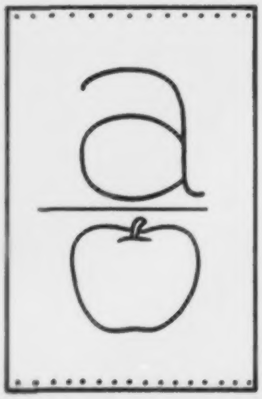
2 PLACE THE EXPOSED SIDE OF THE NEGATIVE PAPER IN CONTACT WITH THE GRAINED SIDE OF THE DIFFUSION TRANSFER LITHO PLATE.



3 FEED BOTH INTO A PLATE PROCESSOR FILLED WITH DIFFUSION TRANSFER ACTIVATOR.

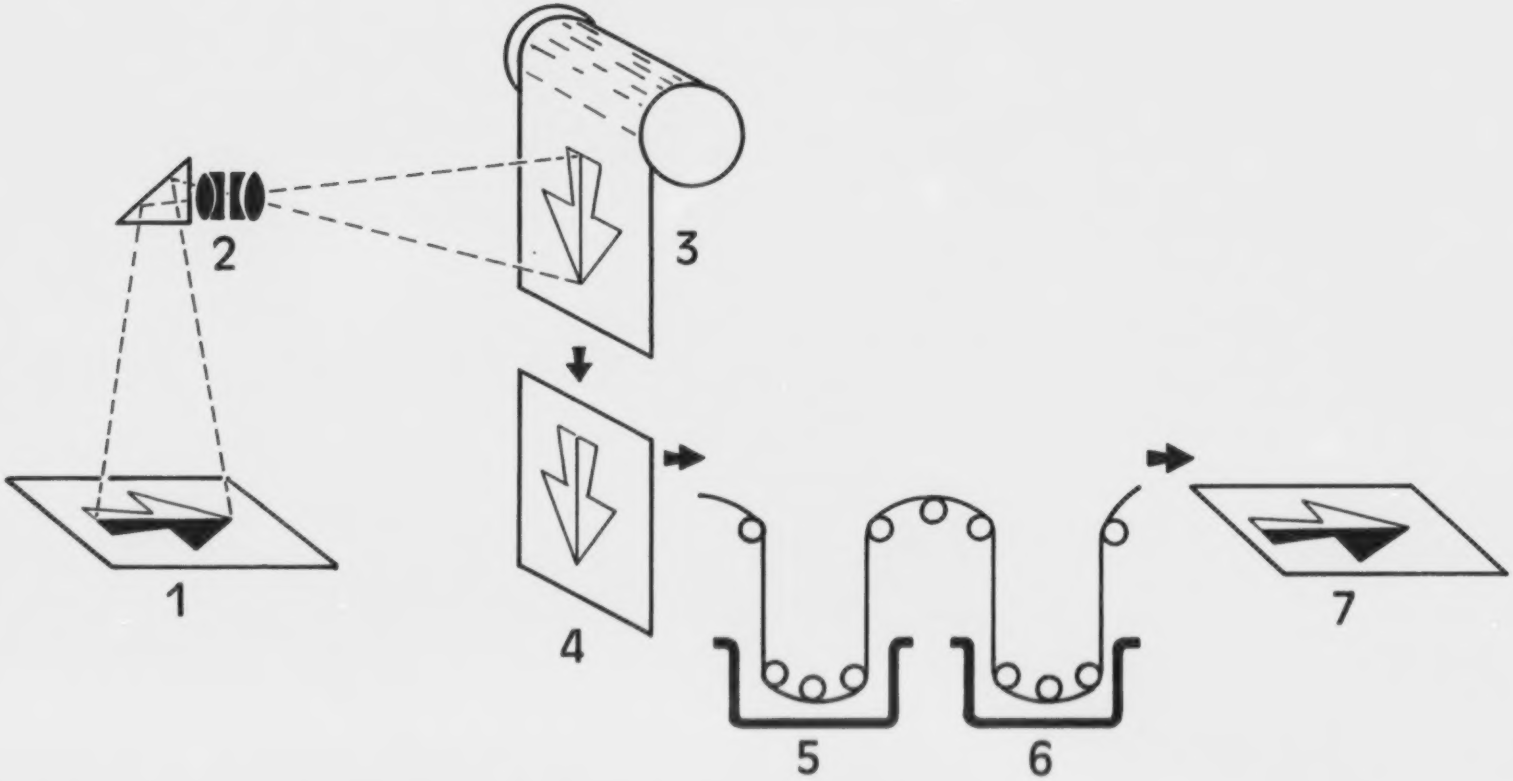


4 WAIT 30 SECONDS UNDER SAFELIGHT CONDITIONS AND PEEL APART. FIX THE PLATE WITH PLATE FIXER AND GUM WITH PLATE GUM.



5 THE COMPLETED PLATE IS NOW READY FOR PRESS OR STORAGE.

Camera-Direct Platemaking

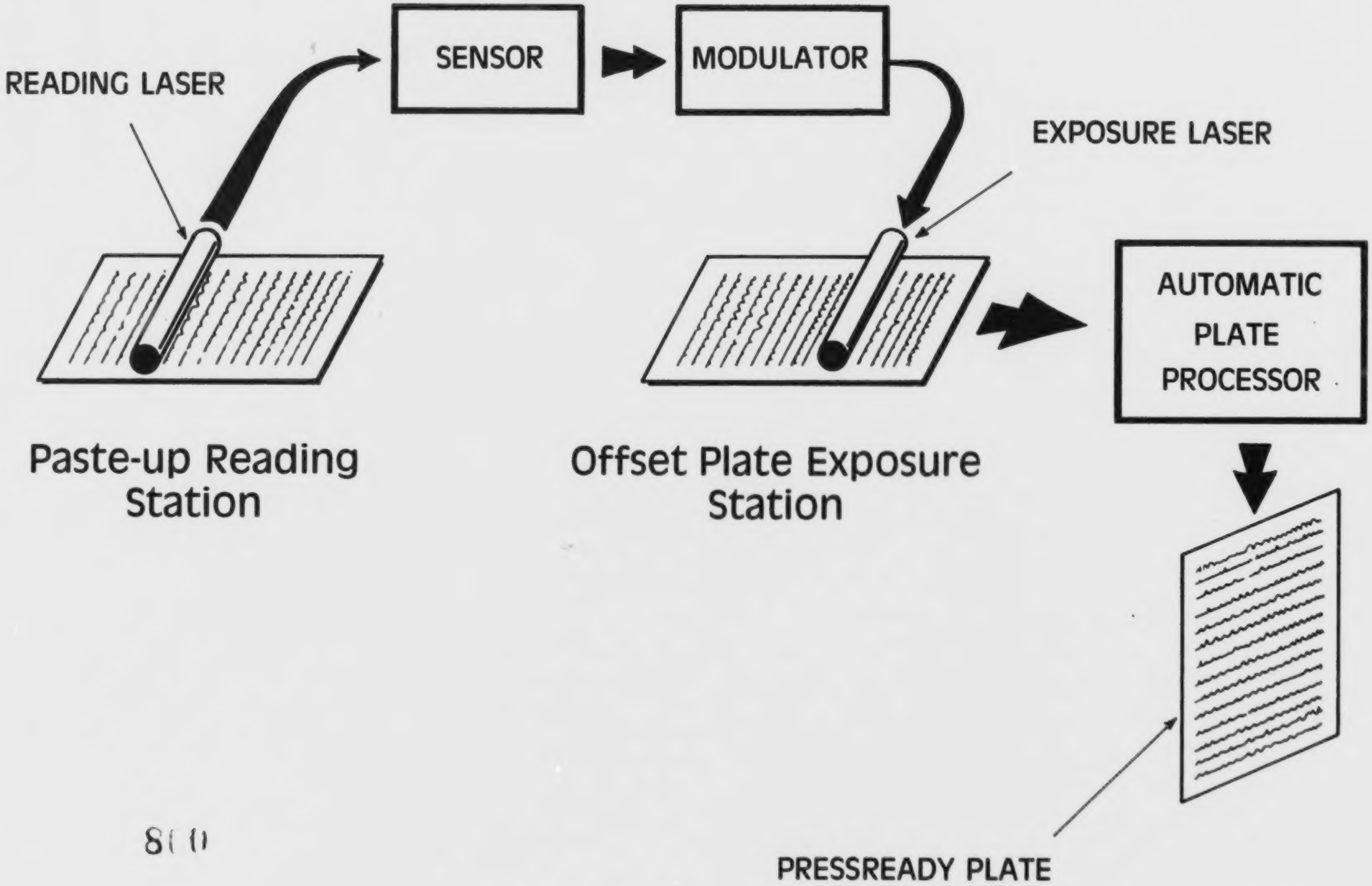


1065

Copy (1) is photographed by prism/lens (2) and projected onto plate material (3). Plate material is cut to length (4), processed (5), and dried (6) to press (7).

TM 2

Laser Imaging



READING LASER

SENSOR

MODULATOR

EXPOSURE LASER

Paste-up Reading Station

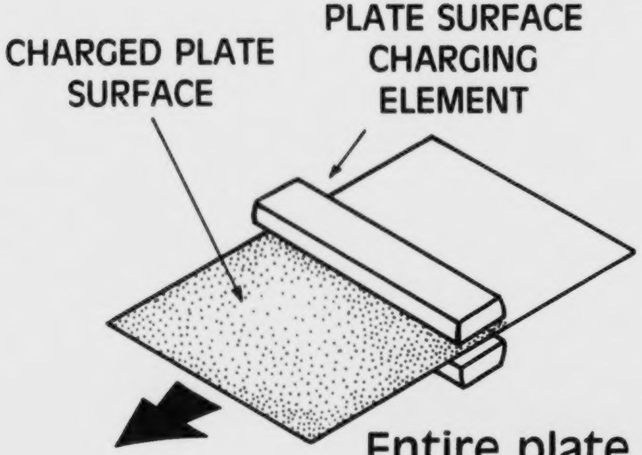
Offset Plate Exposure Station

AUTOMATIC PLATE PROCESSOR

PRESSREADY PLATE

Electrostatic Platemaking

(Camera-Direct)


CHARGED PLATE SURFACE
PLATE SURFACE CHARGING ELEMENT

Entire plate surface is electrostatically charged.

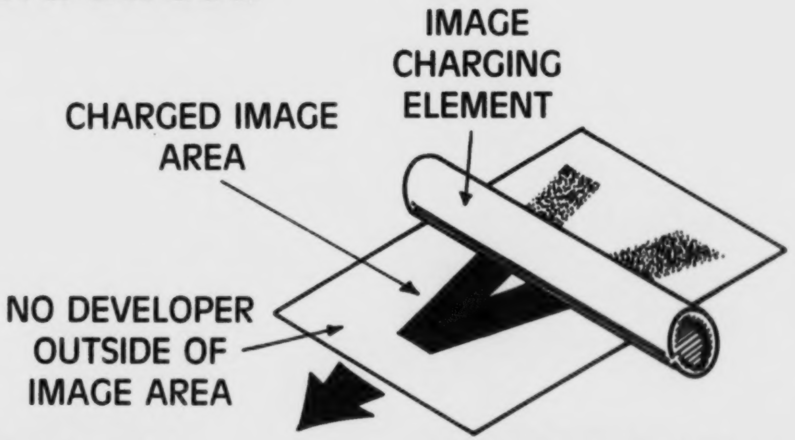
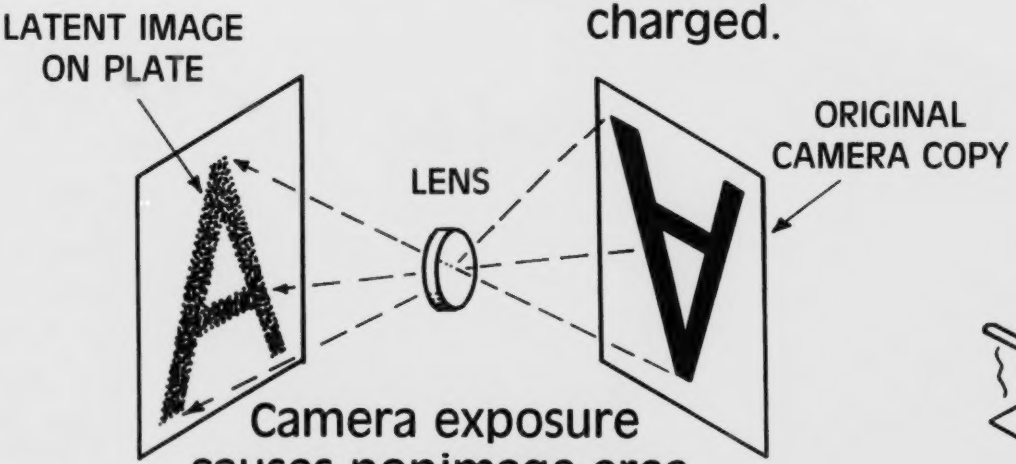


IMAGE CHARGING ELEMENT
CHARGED IMAGE AREA
NO DEVELOPER OUTSIDE OF IMAGE AREA

Developer-toner adheres only to the charged image area.

1069


LATENT IMAGE ON PLATE
LENS
ORIGINAL CAMERA COPY

Camera exposure causes nonimage area to lose charge.

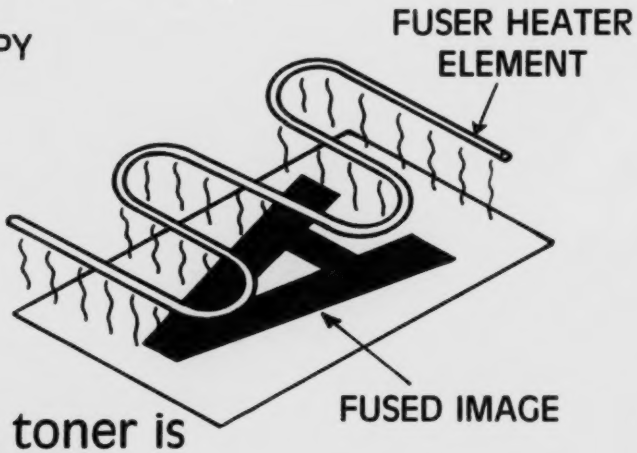
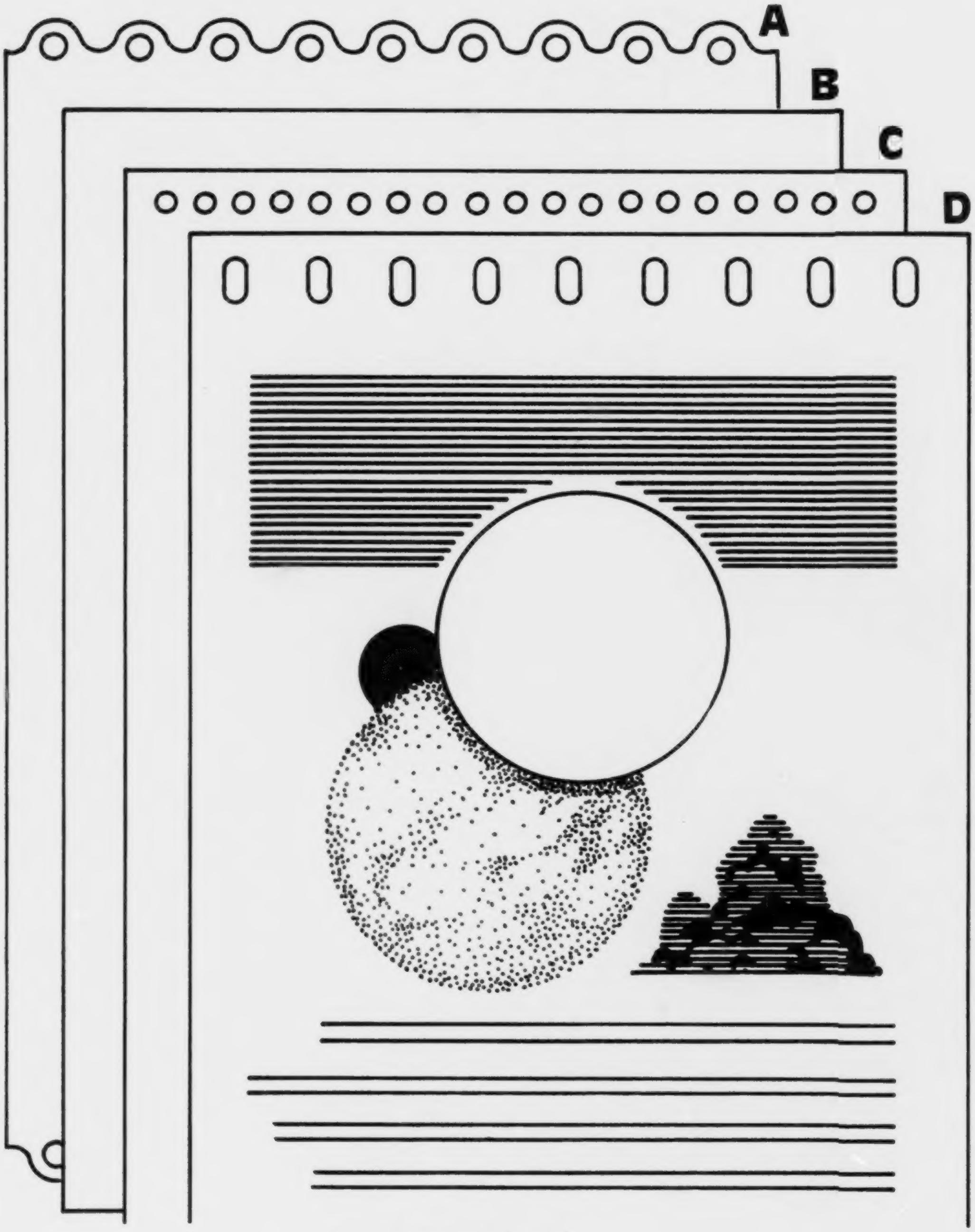

FUSER HEATER ELEMENT
FUSED IMAGE

Image area toner is fused by heat.

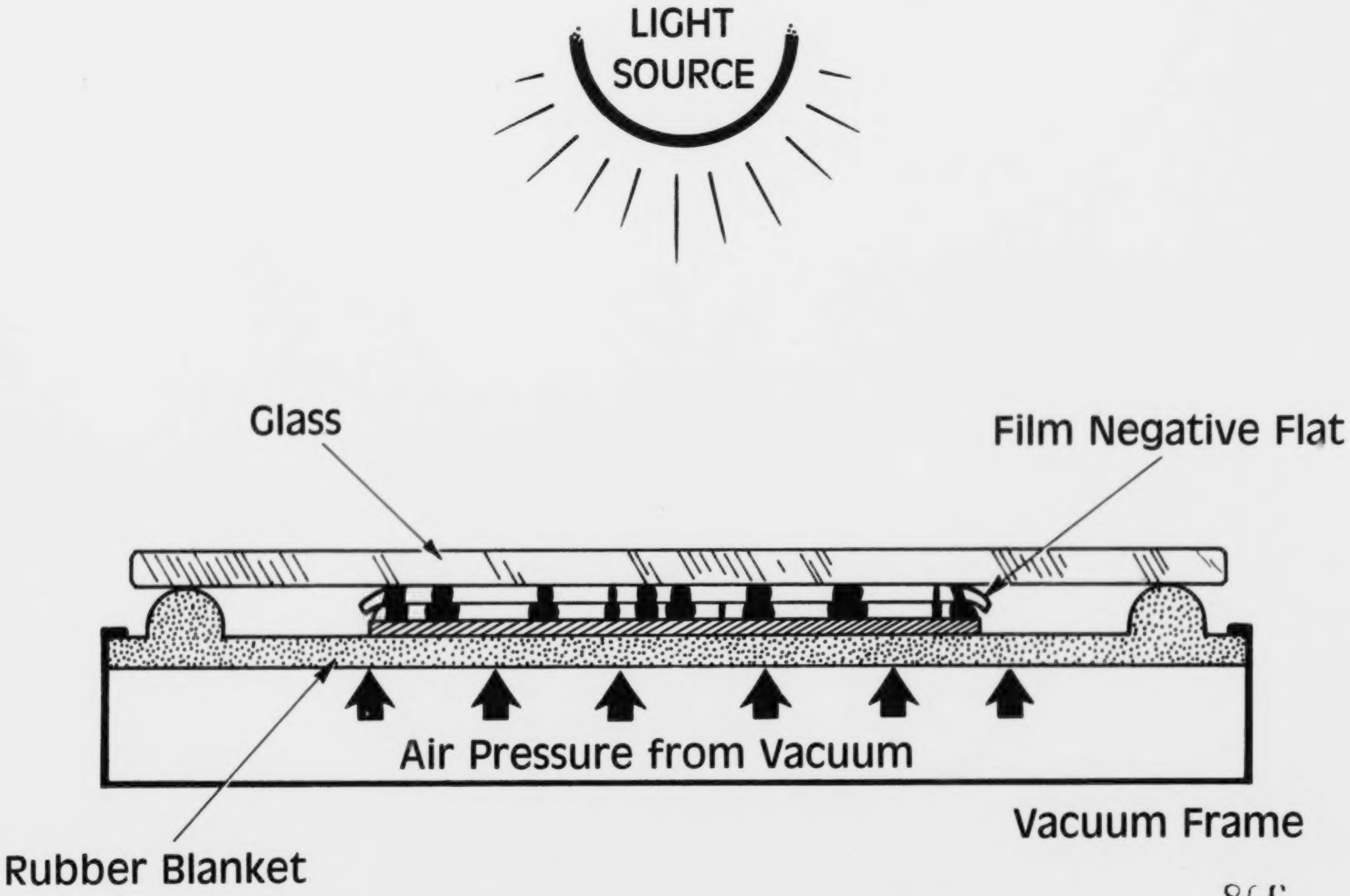
TM 4

Plate End Styles



A - Serrated
B - Straight
C - Round Hole (Pin Bar)
D - Oval Hole

Exposing Plates in Vacuum Frame


LIGHT SOURCE
Glass
Film Negative Flat
Air Pressure from Vacuum
Vacuum Frame
Rubber Blanket

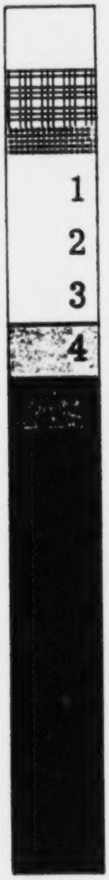
1073

TM 6

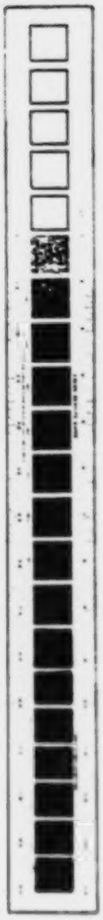
805

806

Quality Control Devices

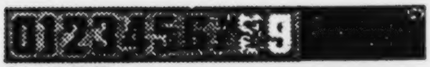


10 Step Platemaker's Guide (Transparent Gray Scale)

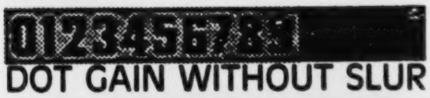


21 Step Platemaker's Guide (Transparent Gray Scale)

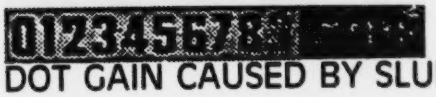
PLATE SENSITIVITY GUIDES



SHARP



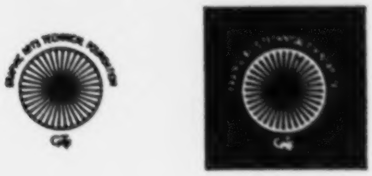
DOT GAIN WITHOUT SLUR



DOT GAIN CAUSED BY SLUR

Printed Images of Dot Gain Scales

Positive and Negative Star Targets



Safety Tips

- Do not breathe the fumes of chemicals. Work in an area with proper ventilation.

- Avoid skin contact with chemicals, and wash skin *immediately* if contact occurs.

- Open cans and bottles of chemicals with the top aimed *away* from your face.

- Wear protective clothing that you can remove before leaving the lab.

- Throw away *all* used plate wipes and cotton swabs after use.

- Do not operate plate exposure equipment and automatic processing equipment with wet hands.

- Avoid looking directly at the exposure light - *protect your eyes!*

- Protect your hands from sharp edges when handling plates.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT X : IMAGE CARRIERS

SCOPE OF UNIT:

This unit provides basic, broad and general information about offset litho image carriers. It explores a wide variety of image carrying devices and then zeroes in on the making of additive and negative plates.

INFORMATION TOPIC: OR DEMONSTRATION: X-2

DETERMINING EXPOSURE AND PROCESSING AN ADDITIVE PLATE
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Expose an additive plate using a platemaker's guide on one edge according to the steps of procedure.
2. Process an additive plate according to the steps of procedure.
3. Process an additive plate using one-step developer according to the steps of procedure.
4. Check the exposure time of an additive plate according to the steps of procedure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Processing Additive Plates
2. Exposure unit
3. Additive plate
4. Platemaker's guide
5. Light source
6. Newspaper pad
7. Plate sink
8. Cellulose sponge

9. Desensitizer gum
10. Developing lacquer
11. Plate pad
12. Gum arabic
13. Cheesecloth
14. One-step developer

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Blair, Raymond N., ed. The Lithographer's Manual. 7th ed. Pittsburgh, PA: The Graphic Arts Technical Foundation, 1983.

INTRODUCTION:

Using the information from the previous lesson, we are now prepared to actually expose and process an additive plate. Remember to adhere to all applicable safety considerations during this procedure and check the exposure time with the platemaker's guide.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT X : IMAGE CARRIERS

STEPS OF PROCEDURE:

EXPOSING THE PLATE

1. Open glass frame of exposure unit. Inspect glass, clean if necessary.

2. Place plate on rubber blanket of platemaker with gripper edge toward you.

   NOTE: If a multiple burn plate is to be made, punch plate and place on pin bar. Be sure sensitive side of plate is up.

3. Lay the flat over plate in position. Place on pins if used.

4. Place platemaker's guide on one edge of the plate, out of the work.

   NOTE: It may be necessary to cut a flap from the flat to make room for the platemaker's guide. Place a piece of clear film over the guide to simulate a negative.

5. Close and lock the glass frame.

6. Turn on vacuum to remove air from frame and force the plate and flat into tight contact against the frame.

   NOTE: Watch the vacuum gauge. There should be at least 20-26 inches of vacuum.

7. Inspect the flat and plate through the glass for dirt or poor contact.

8. If problems are present, turn off vacuum, open, clean and repeat above.

9. Place vacuum frame with plate facing light source.

10. Set time for recommended exposure time and start light.

    CAUTION: Do not look at light.

11. When exposure is complete, turn off vacuum and remove plate and negative.

12. If a multiple exposure plate is being made, repeat the above process for each succeeding flat.

    NOTE: Use the platemaker's guide only on the first burn.

PROCESSING THE ADDITIVE PLATE (HO 1)

1. Clamp plate image-side up on a pad of newspaper or place in plate sink.

2. Using clean, soft cellulose sponge, scrub plate firmly with desensitizer gum.

   NOTE: Be sure to cover the entire plate. (Any portion left sensitized will become image.)

3. Squeeze out sponge and wipe away excess desensitizer, leaving sensitizer film on plate.

4. Pour a small puddle of developing lacquer onto plate.

   NOTE: The amount of image area dictates the amount needed.

5. Using a plate pad, rub the lacquer over the entire plate in a small circular motion. A uniform, solid color should appear.

6. Sponge off or wash off excess developer and desensitizer.

   NOTE: Never use excess water on paper based plates.

7. Squeegee off water.

8. Apply 7° Baume gum arabic and spread with a sponge.

9. Buff this dry by lightly polishing plate with clean, dry cheesecloth.

ALTERNATIVE PROCESSING OF ADDITIVE PLATES

Most plate manufacturers have available a one-step developer solution for use with additive plates. This is an emulsion of desensitizer gum and developing lacquer.

1. Prepare plate as before on pad of paper.

2. Shake the one-step developer well.

   NOTE: IMPORTANT! All gum and lacquer must be uniformly mixed.

3. Pour a puddle of one-step developer onto plate and spread with clean, soft cellulose sponge.

4. Rub firmly in circular motion until entire plate is covered and image is visible.

   NOTE: This image will not be as bright as conventional developing.

5. Squeeze out sponge and remove excess developer/gum solution.

   NOTE: Leave a slight film or haze of gum/developer on plate to protect it. Do not wash.

   NOTE TO INSTRUCTOR: Conventional processing is the preferred method of platemaking for the classroom. The student can then clearly see each chemical as it is used and understand the purpose of each.

CHECKING THE EXPOSURE TIME OF PLATE

1. After plate has been gummed and dried, inspect the platemaker's guide. (See manufacturer's instructions packed with plates.) Typical recommendation is that the guide should show a solid step 6 for negative plate.

2. If solid 6 is the highest solid step on the guide, the exposure time is correct. If the highest solid step is other than 6, the exposure time is incorrect and needs to be adjusted. Adjust exposure for next plate.

3. Once exposure time has been determined, it is not necessary to use the guide on every plate. It should, however, be used periodically to check exposure.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT X : IMAGE CARRIERS

INTERACTION ITEMS:

1. What safety considerations should be followed when exposing and processing an additive plate?
2. Discuss the alternative methods of processing additive plates. Why is the conventional method preferred?
3. How is the platemaker's guide used in processing additive plates?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT X : IMAGE CARRIERS

EVALUATION ITEMS: NAME OF STUDENT:________________

DETERMINING EXPOSURE AND PROCESSING AN ADDITIVE PLATE

EQUIPMENT:

1. Exposure unit
2. Additive plate
3. Platemaker's guide
4. Light source
5. Newspaper pad
6. Plate sink
7. Cellulose sponge
8. Desensitizer gum
9. Developing lacquer
10. Plate pad
11. Gum arabic
12. Cheesecloth
13. One-step developer

DID THE STUDENT:	YES	NO
EXPOSE THE PLATE 1. Open glass frame of exposure unit. Inspect glass, clean if necessary.		
2. Place plate on rubber blanket of platemaker.		
3. Lay the flat over plate in position. Place on pins if used.		
4. Place platemaker's guide on one edge of the plate.		
5. Close and lock the glass frame.		
6. Turn on vacuum.		
7. Inspect the flat and plate through the glass.		
8. If problems are present, turn off vacuum, open, clean and repeat above.		
9. Place vacuum frame with plate facing light source.		
10. Set time for recommended exposure time and start light.		
11. When exposure is complete, turn off vacuum and remove plate and negative.		

DID THE STUDENT:	YES	NO
12. If a multiple exposure plate is being made, repeat the above process for each succeeding flat.		
PROCESS THE ADDITIVE PLATE 1. Clamp plate image-side up on a pad of newspaper or place in plate sink.		
2. Scrub plate with desensitizer gum.		
3. Wipe away excess desensitizer leaving sensitizer film on plate.		
4. Pour lacquer onto plate and rub over entire plate.		
5. Watch for appearance of uniform, solid color.		
6. Remove excess developer and desensitizer.		
7. Squeegee off water.		
8. Apply gum arabic and spread with a sponge.		
9. Buff dry.		
PROCESS ADDITIVE PLATES BY ALTERNATIVE METHODS (ONE-STEP DEVELOPER) 1. Prepare plate as before on pad of paper.		
2. Shake the one-step developer well.		
3. Pour developer onto plate and spread with sponge.		
4. Rub until plate is covered and image is visible.		
5. Squeeze out sponge and remove excess developer/gum solution.		
CHECK THE EXPOSURE TIME OF PLATE 1. After plate has been gummed and dried, inspect the platemaker's guide.		

DID THE STUDENT:	YES	NO
2. If the exposure time is incorrect, adjust exposure for next plate.		
3. Once exposure time has been determined, process other plates.		

The student has satisfactorily completed the procedure "Determining Exposure and Processing an Additive Plate" according to the steps of procedure.

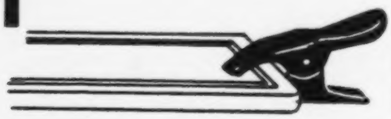
Instructor's Signature
(Verifying Satisfactory Completion)

Date

HO 1

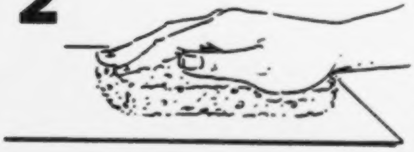
Processing Additive Plates

1



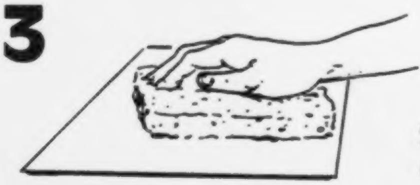
Clamp plate, image-side up, on pad of newspaper or place in plate sink.

2



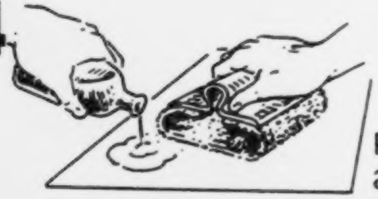
Using clean, soft cellulose sponge, scrub plate firmly with desensitizer gum. Be sure to cover entire plate. (Any portion left sensitized will become image.)

3



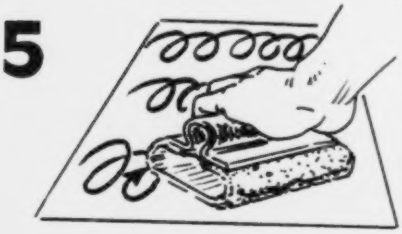
Squeeze out sponge and wipe away excess desensitizer, leaving a thin film on plate.

4



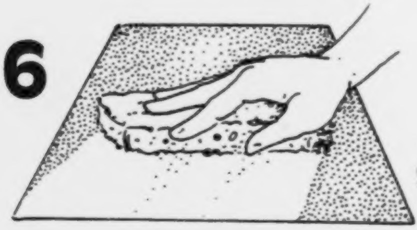
Pour puddle of developing lacquer onto plate. The amount of image dictates the amount needed.

5



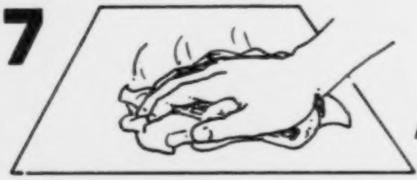
Using plate pad, rub the lacquer over the entire plate with a firm, circular motion. A solid, uniform color should appear.

6



Sponge off excess chemistry.

7



Apply gum - buff dry. Wipe back of plate dry also.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT X : IMAGE CARRIERS

SCOPE OF UNIT:

This unit provides basic, broad and general information about offset litho image carriers. It explores a wide variety of image carrying devices and then zeroes in on the making of additive and negative plates.

INFORMATION TOPIC: OR DEMONSTRATION: X-3

DETERMINING EXPOSURE AND PROCESSING A SUBTRACTIVE PLATE
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Expose a subtractive plate using a platemaker's guide on one edge according to the steps of procedure.
2. Process a subtractive plate according to the steps of procedure.
3. Check the exposure time of a subtractive plate according to steps of procedure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Processing Subtractive Plates
2. Exposure unit
3. Subtractive plate
4. Platemaker's guide
5. Light source
6. Plate sink
7. Subtractive developer
8. Pad
9. Disposable paper wipes

10. Squeegee
11. Gum arabic
12. Cheesecloth

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Blair, Raymond N., ed. The Lithographer's Manual. 7th ed. Pittsburgh, PA: The Graphic Arts Technical Foundation, 1983.

INTRODUCTION:

Today we will expose and process a subtractive plate. Again, it is important to observe safety rules during this procedure. We will also check the exposure time as we did for the additive plate.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT X : IMAGE CARRIERS

STEPS OF PROCEDURE:

EXPOSING THE PLATE

Follow the same procedure for exposing an additive plate as outlined in lesson 2 of this unit.

PROCESSING THE SUBTRACTIVE PLATE (HO 1)

1. Place plate, exposed-side up on work surface in plate sink.
2. Pour a liberal quantity of subtractive developer on pad and plate.
3. Spread over entire plate with pad and allow to stand about 30 seconds.
4. Develop plate using firm pressure and tight circular motion.
5. Clean pad by scraping off loose coating particles

   NOTE: Do not wash pad except at end of day.
6. Squeegee plate and sink area to remove all visible developer and coating particles from plate.
7. Rinse both sides of plate and sink thoroughly.
8. Use disposable paper wipe to mop surfaces while rinsing.
9. Remove all developer and plate sensitizers completely.

   NOTE: Even a small speck of dissolved coating allowed to dry on the plate will become image when printing.
10. Squeegee plate on both sides.
11. Remove plate to dry surface for gumming.
12. If plate still has any wet areas, dry with disposable wipe.
13. Apply 7° Baume gum arabic.

14. Spread with disposable wipe.

15. Buff both sides dry with clean, fresh, dry disposable wipe or new cheesecloth.

16. Check the exposure time of the plate.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT X : IMAGE CARRIERS

INTERACTION ITEMS:

1. How long should subtractive developer stand on plate?
2. When and how should gum arabic be applied to plate?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT X : IMAGE CARRIERS

EVALUATION ITEMS: NAME OF STUDENT:

DETERMINING EXPOSURE AND PROCESSING A SUBTRACTIVE PLATE

EQUIPMENT:

1. Exposure unit
2. Subtractive plate
3. Platemaker's guide
4. Light source
5. Plate sink
6. Subtractive developer
7. Pad
8. Disposable paper wipes
9. Squeegee
10. Gum arabic
11. Cheesecloth

DID THE STUDENT:	YES	NO
EXPOSE THE PLATE PROCESS THE SUBTRACTIVE PLATE 1. Place plate, exposed-side up on work surface.		
2. Pour subtractive developer on pad and plate.		
3. Spread over plate with pad and allow to stand about 30 seconds.		
4. Develop plate.		
5. Clean pad.		
6. Squeegee plate and sink area.		
7. Rinse both sides of plate and sink.		
8. Mop surfaces while rinsing.		
9. Remove all developers and plate sensitizers.		
10. Squeegee plate on both sides.		
11. Remove plate to dry surface.		
12. If plate still has any wet areas, dry with disposable wipe.		
13. Apply gum arabic.		

DID THE STUDENT:	YES	NO
14. Spread with disposable wipe.		
15. Buff both sides.		
16. Check the exposure time of the plate.		

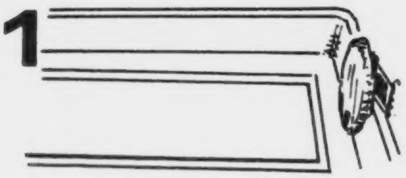
The student has satisfactorily completed the procedure "Determining Exposure and Processing a Subtractive Plate" according to the steps of procedure.

____
Instructor's Signature
(Verifying Satisfactory Completion)

____
Date

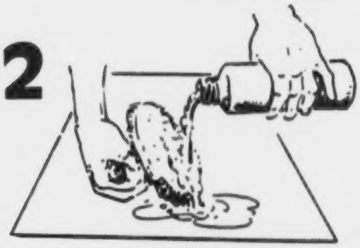
Processing Subtractive Plates

1



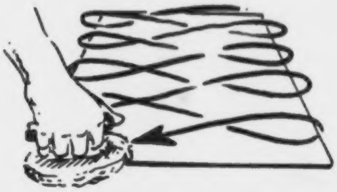
Place plate, exposed-side up, on work surface, preferably a plate sink.

2



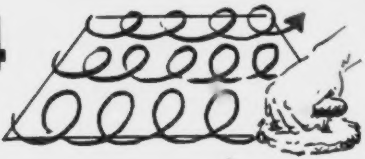
Pour liberal quantity of subtractive developer on pad and plate.

3



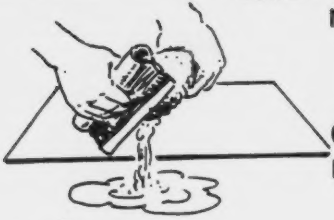
Spread over entire plate with pad and allow to stand for approximately 30 seconds.

4



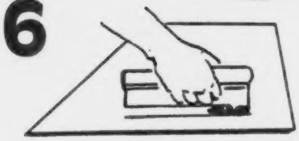
Develop using firm pressure and tight circular motion.

5



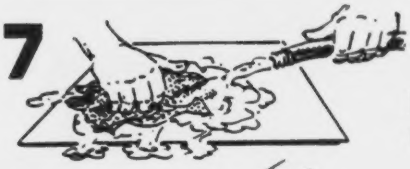
Clean pad by scraping off loose coating particles. Do not wash pad.

6



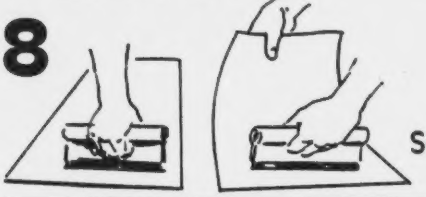
Squeegee plate and sink area to remove all visible developer and coating particles from plate.

7



Rinse both sides of plate and sink thoroughly. Use disposable wipe to mop surfaces.

8



Squeegee plate dry and apply gum. Buff dry.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

SCOPE OF UNIT:

The basic operation of the offset press has not changed since the beginning of the lithographic process. Presses have become faster and better but the principle remains the same. This unit covers the operation and safety of a duplicator; however, the terminology remains the same for a large sheet-fed or large web press.

INFORMATION TOPIC: XI-1 OR DEMONSTRATION:

PRESS SAFETY

(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify points in personal safety.
2. Identify points in equipment safety.
3. Identify points in work area safety.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Press Safety
2. AS 1: Pressroom Safety Check
3. Video Tape GA-88-180: Offset Press/Duplicator. Available from The Media Center, State Fair Community College, 1900 Clarendon Rd., Sedalia, MO 65301 (816)826-7100

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 13, pp. 319-346.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch. 15, pp. 341-422.

Adams, J. Michael and David D. Faux, Printing Technology, 2nd ed. North Scituate, MA: Breton Publishers, 1982, chs. 12, 13, pp. 290-338.

REFERENCES:

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 6, pp. 128-149.

Cogoli, John E. Photo-Offset Fundamentals. Bloomington, IL: McKnight Publishing Company, 1980.

Porter, A. S. Lithographic Presswork. Pittsburgh, PA: Graphic Arts Technical Foundation, 1982.

INTRODUCTION:

The first and most important aspect of offset presswork is safety. Safety begins by developing good work habits and applying those habits to the daily operation of the press. This unit is designed to make the student safety conscious.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

OUTLINE: (Key Points)

I. Permission to Operate Press - no one should operate a press without permission of the instructor and the presence of another person in the pressroom

II. Personal Safety (HO 1)

   A. Hair - hair should be tied at the back of the neck

   B. Jewelry - no jewelry should be worn when operating a press

   C. Clothing - clothing should not be loose; sleeves or shirt tails can get caught in the machine

III. Equipment Safety

   A. Electrical - electric cords should come from above or be encased in conduit, not in a walkway

   B. Lighting - adequate lighting is necessary for safe operation of the press; not all presses have built-in lights

   C. Noise - for protection of hearing, the noise level should not be above 90 decibels

   D. Guards - guards which protect both operator and press should never be removed from the press, nor safety switches be shorted across

   E. OSHA - schools should comply with OSHA safety regulations regardless of whether they come under OSHA jurisdiction

IV. Work Area Safety

   A. Rags - rags that have been used should be kept in containers to prevent chemical contamination and possible fire

B. Housekeeping - neat and organized work areas prevent accidents; 85% of all accidents are avoidable

C. Fire - use of hazardous chemicals must be monitored; smoking should be restricted to areas where chemicals will not endanger work

D. Tools - tools should be returned to their proper location not only for easy access but to prevent dropping them on the press or the operator tripping and stumbling over them

E. Chemicals - always add acid to water, not water to acid

F. Paper - paper spoilage should be placed in disposal containers to prevent operator from slipping

V. Summary and Conclusion

A. Permission to operate press

B. Personal safety

C. Equipment safety

D. Work area safety

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LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

INTERACTION ITEMS:

1. Why should hair be tied back and jewelry removed when operating a press?
2. What work habits lead to safe press operation?
3. How many people should operate a small press at one time?
4. How does excessive noise interfere with safe work habits?
5. Press chemicals present what type of a work hazard?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Make a list of unsafe conditions around the presses.
2. List ten safety rules that apply only to the press area. Make a safety poster depicting one of the safety rules.
3. Locate and check date on fire extinguishers. What type of extinguisher should be in the press room?

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

EVALUATION ITEMS:

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 1. Dirty rags can present a chemical hazard in the pressroom.

____ 2. Electrical wiring should come from overhead.

____ 3. Loose sleeves can get caught in the press.

____ 4. Guards on presses protect the operator, not the press.

____ 5. Permission should be received before operating a press.

____ 6. Tools left lying around may present a hazard to the press.

____ 7. Paper spoilage should be placed in disposal containers to prevent operator from slipping.

____ 8. Lubricate the press when it is not running.

____ 9. Always add acid to water, not water to acid.

____10. Jewelry doesn't belong in the pressroom.

LESSON PLAN: 1

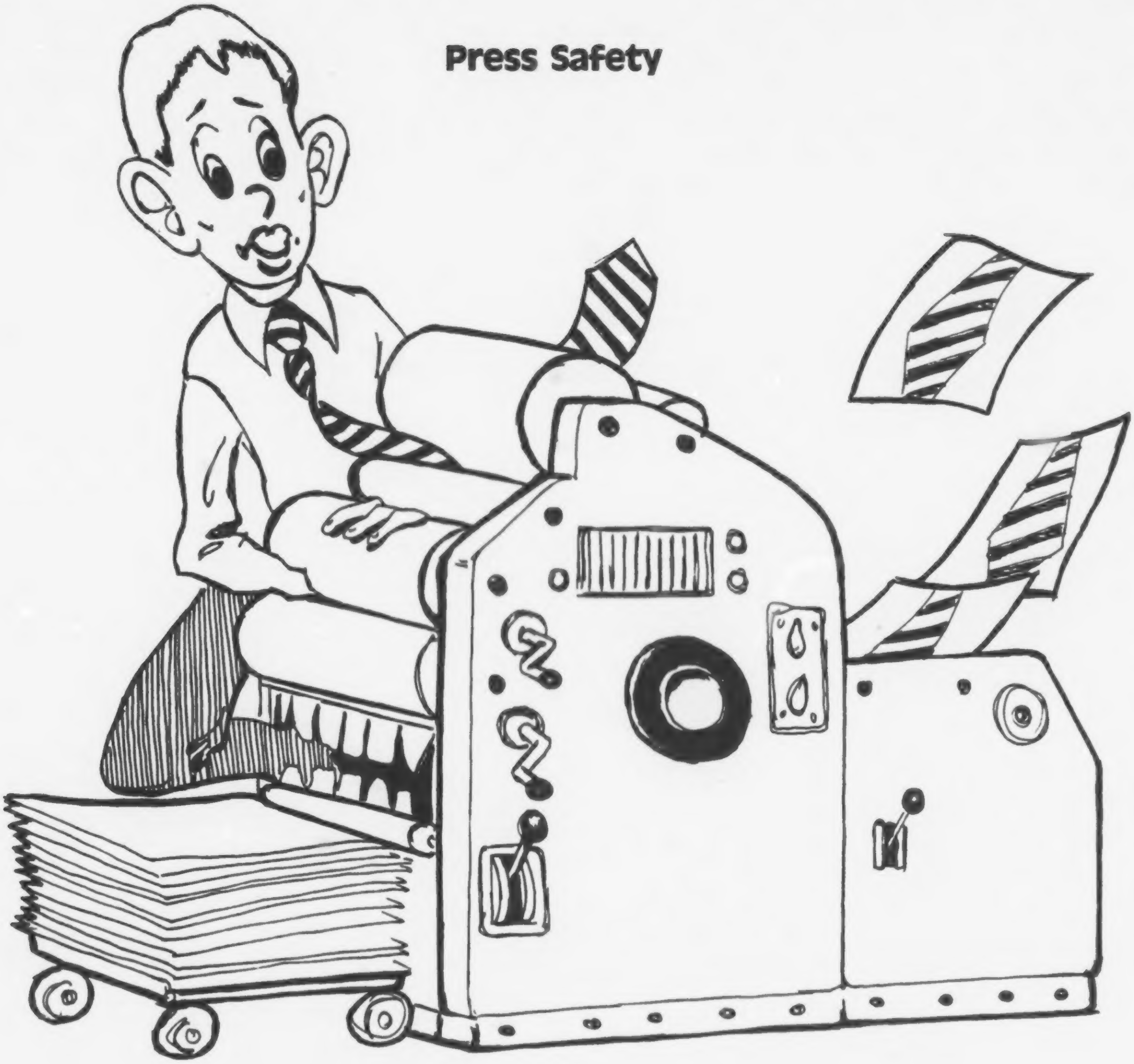
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

ANSWERS TO EVALUATION ITEMS:

1. T
2. T
3. T
4. T
5. T
6. T
7. T
8. T
9. T
10. T

Press Safety



- Avoid loose fitting clothing or dangling jewelry when working around a press.
- Tie back hair or keep hair short when working around a press.
- Never remove safety guards from the moving parts of a press.

ASSIGNMENT SHEET 1 - PRESSROOM SAFETY CHECK

Directions: Conduct a safety inspection of the pressroom, noting all safety rules that are being violated. Give the list to the instructor and ask for guidance in correcting the problems. Conduct another safety inspection four weeks later, noting safety problems that have been corrected.

	FIRST INSPECTION	SECOND INSPECTION
1. All people working around the press are dressed safely.		
2. Electrical wiring is in accordance with safety rules.		
3. Dirty rags are deposited in proper containers.		
4. All press and switch guards are on.		
5. All wastepaper and excess oil around the press have been cleaned up.		
6. Tools have been returned to their proper places after use.		
7. There are always two people in the pressroom when a press is being run.		
8. Press dollies and paper skids are stacked properly away from press and aisles.		
9. Long hair is properly tied behind the neck.		
10. All chemicals used in the pressroom are capped when not in use.		
11. Other safety rules noted: __________ __________ __________ __________ __________		

ANSWERS TO ASSIGNMENT SHEET 1 - PRESSROOM SAFETY CHECK

Evaluation of this assignment should be based on the following criteria:

1. A complete inspection of the pressroom, noting any violations.
2. Consulting with instructor to correct violations.
3. Completion of follow-up inspection, noting status of safety violations discovered during first inspection.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

SCOPE OF UNIT:

The basic operation of the offset press has not changed since the beginning of the lithographic process. Presses have become faster and better but the principle remains the same. This unit covers the operation and safety of a duplicator; however, the terminology remains the same for a large sheet-fed or large web press.

INFORMATION TOPIC: XI-2 AND DEMONSTRATION: XI-2

JOGGING PAPER
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Define terms related to jogging stock.
2. Define terms related to loading a feeder on an offset press.
3. Fan and jog stock for loading on press according to the steps of procedure.
4. Load jogged stock into the feeder of an offset press according to the steps of procedure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Jogging Paper
2. Paper
3. Table
4. Offset press feeder

INFORMATIONAL ASSIGNMENT: (Student)

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 11, p. 196.

Cogoli, John E. Photo-Offset Fundamentals. Bloomington, IL: McKnight Publishing Company, 1980, ch. 15, p. 281.

REFERENCES:

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 11, p. 196.

Cogoli, John E. Photo-Offset Fundamentals. Bloomington, IL: McKnight Publishing Company, 1980, ch. 15, p. 281.

Porter, A. S. Lithographic Presswork. Pittsburgh, PA: Graphic Arts Technical Foundation, 1982.

INTRODUCTION:

The primary factor in the operation of an offset press is to have the paper feed properly. Any malfunction in the feeder results in poor quality printing and poor registration. To insure proper feeding, the stock must be loaded properly into the press. This is done by jogging the paper prior to loading, and allowing air between the sheets so that sheets float instead of slide into the grippers. Use a variety of types and sizes of paper, as some jog easier than others.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

OUTLINE: (Key Points)

I. Jogging Stock (HO 1)

A. Controllable stock - the amount of stock that can be easily handled by the operator

B. Fanning - bending corners and pinching stock to allow air between sheets

C. Jogging - allowing the stock to drop a short distance to a hard surface, releasing the pressure on the corners

D. Stacking - stacking jogged sheets evenly in a stack prior to loading into press feeder; stock can be loaded directly into press

II. Loading Feeder

A. Spacer - a piece of cardboard placed at the bottom of the feeder to help support paper on feeder platform

B. Loading - placing a controllable amount of paper in the feeder with the bottom sheets against the guides; push the remaining sheets into position on top

C. Airing - allowing air to remain in the stock, ensuring good paper feeding and less static problems

D. Static is caused by low humidity in the press room and sheets rubbing against each other.

III. Mechanical Jogger - machine that vibrates and automatically jogs paper

IV. Procedure for Jogging Paper

   A. Pick up a controllable amount of paper.

   B. Lay stock flat on table.

   C. Fan stock.

   D. Jog stock.

   E. Turn stock 90 degrees and repeat steps A-D.

   F. Repeat steps D and E until paper is aired and even.

   G. Load into offset press feeder.

   H. Repeat process until all stock is loaded.

V. Summary and Conclusion

   A. Jogging stock

   B. Loading feeder

   C. Mechanical jogger

   D. Procedure for jogging paper

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LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

INTERACTION ITEMS:

1. What is the primary factor in the proper operation of the offset press?
2. What are the results of improper paper feeding?
3. How should the paper be prepared before loading it in the feeder?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

EVALUATION ITEMS:

Define the following terms.

1. Controllable stock:

2. Fanning:

3. Jogging:

4. Airing:

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

EVALUATION ITEMS: NAME OF STUDENT: ____________________

JOGGING PAPER

EQUIPMENT:

1. Paper
2. Table
3. Offset press feeder

DID THE STUDENT:	YES	NO
1. Pick up a controllable amount of paper.		
2. Lay stock flat on table.		
3. Fan stock.		
4. Jog stock.		
5. Turn stock 90 degrees and repeat steps 1-4.		
6. Repeat steps 4 and 5 until paper is aired and even.		
7. Load into offset press feeder.		
8. Repeat process until all stock is loaded.		

The student has satisfactorily completed the procedure "JOGGING PAPER" according to the steps outlined.

____
Instructor's Signature
(Verifying Satisfactory Completion)

____
Date

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

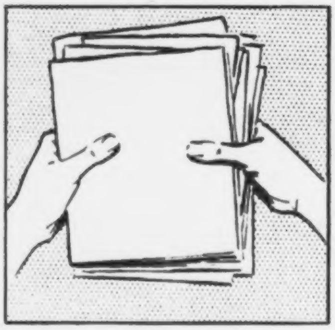
UNIT XI : OFFSET PRESS

ANSWERS TO EVALUATION ITEMS:

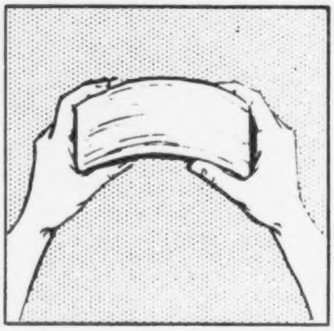
1. Controllable stock: the amount of stock that can be easily handled by the operator
2. Fanning stock: bending corners and pinching stock to allow air between sheets
3. Jogging: allowing the stock to drop a short distance to a hard surface, releasing the pressure on the corners
4. Airing: allowing air to remain in the stock, ensuring good paper feeding and less static problems

HO 1

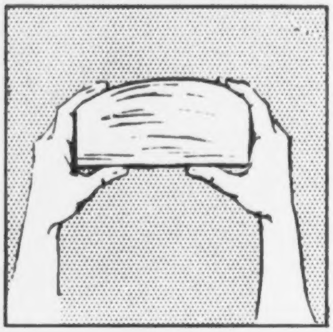
Jogging Paper



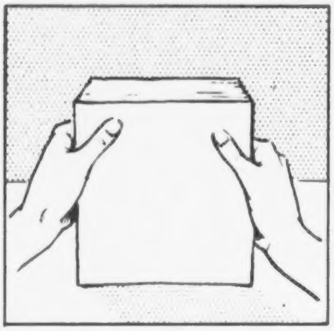
Take twenty-five to two-hundred uneven sheets of paper.



Fan paper to introduce a blanket of air between the sheets.



Stretch bottom sheets taut to allow a blanket of air between each sheet.



Drop paper against table to jar uneven sheets in place.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

SCOPE OF UNIT:

The basic operation of the offset press has not changed since the beginning of the lithographic process. Presses have become faster and better but the principle remains the same. This unit covers the operation and safety of a duplicator; however, the terminology remains the same for a large sheet-fed or large web press.

INFORMATION TOPIC: XI-3 AND DEMONSTRATION: XI-3

PRESS FEEDER
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify parts of the sheet-fed feeder.
2. Distinguish the various types of feeders.
3. Set the feeder to feed paper correctly into the press according to the steps of procedure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Sheet-Fed Feeder
2. Paper in paper feeder

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 13, pp. 319-346.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, chs. 15, 16, pp. 341-422.

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, chs. 12, 13, pp. 290-338.

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Cogoli, John E. Photo-Offset Fundamentals. Bloomington, IL: McKnight Publishing Company, 1980.

Porter, A. S. Lithographic Presswork. Pittsburgh, PA: Graphic Arts Technical Foundation, 1982.

INTRODUCTION:

The feeder is the first operation in preparing the press for production. Time should be taken to set the feeder properly and to load the stock. If the paper will not feed properly, subsequent press operations will be affected. Paper should be cut correctly, and jogged and loaded into the feeder with skill. If paper is left in the feeder overnight, it should be removed, jogged again and loaded to prevent a build-up of static electricity. When the feeder is loaded and set properly, idle some sheets of paper through the press to see that the feeder and delivery are working properly.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

OUTLINE: (Key Points)

I. Types of Feeders

   A. Pile - paper is fed into the press a single sheet at a time from a pile of jogged paper

   B. Stream - paper is fed from a pile; however, the press doesn't have to be stopped to reload

   C. Web - paper is fed into the press from a roll of paper

II. Paper Handling

   A. Sheet-fed - paper is fed into the press a single sheet at a time (HO 1)

   B. Stream-fed - a constant stream of sheets are fed into the press; each sheet covers a portion of the sheet under it

   C. Web-fed - paper is fed into the press from a roll and cut into sheets at the delivery end

III. Paper Forwarding

   A. Double sheet detector - a detector that allows a single sheet to pass underneath, but stops the feeder if two thicknesses attempt to pass underneath

      1. Mechanical - detector that is mechanical in construction

      2. Electrical - detector that trips a circuit during operation

   B. Suckers - vacuum rubber suckers that pick up the sheet from the pile and forward it to the feed table

   C. Feed rolls - rollers that forward the paper to the guides after paper is released from the suckers

   D. Sheet separators - operator air vents that separate the top several sheets allowing the suckers to pick up a single sheet

E. Pile height - a foot that maintains the proper height of the stack

F. Tail guide - a variety of stops at the tail of the sheet to keep the air contained in the pile

IV. Feed Table - table on which paper is positioned correctly prior to entering the printing unit

A. Side guide - finger that places the sheet sideways to correct margins

1. Push - a push type of side guide is used with a sheet-fed feeder

2. Pull - a pull type of side guide is used with a stream-fed feeder

B. Front stops - adjustable guides that position the sheet properly front to back, not found on most duplicators

C. Sheet hardware - brushes, rollers, and finger guides that help the press operator hold the sheet in the proper position

V. Procedure for Setting the Press Feeder

A. Move sheet forward by the hand wheel from its position in paper feeder. Turn the wheel until the sheet is against the front stops.

B. Position side guide.

C. Set wheels/brushes against back of sheet.

D. Turn hand wheel until sheet is in delivery.

E. Check to see if side guide pushed/pulled sheet.

VI. Summary and Conclusion

A. Types of feeders

B. Paper handling

C. Paper forwarding

D. Feed table

E. Procedure for setting the press feeder

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

INTERACTION ITEMS:

1. On the paper, where are the sheet separators for a sheet-fed feeder?
2. What are the advantages of a stream-fed press?
3. How does the second set of suckers help pick up the sheet?
4. How does the air and vacuum vary for various thicknesses of paper?
5. What is the three-point register system?
6. What determines the height of the stack?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Turn air off and all the way on; discuss best setting for paper.
2. Set the double sheet detector for several different thicknesses of paper. What happens if two or more sheets go through the detector?
3. Load paper in the feeder and adjust air to separate three to five sheets of paper. What adjustments need to be made to correctly pick up a single sheet of paper?
4. Change pressure of forwarding rolls and feed paper. What happens when rolls are not correct?
5. Loosen tapes on feed table and feed paper. What problems are incurred?
6. A field trip to an offset plant that has sheetfed and web presses is encouraged.

LESSON PLAN: 3

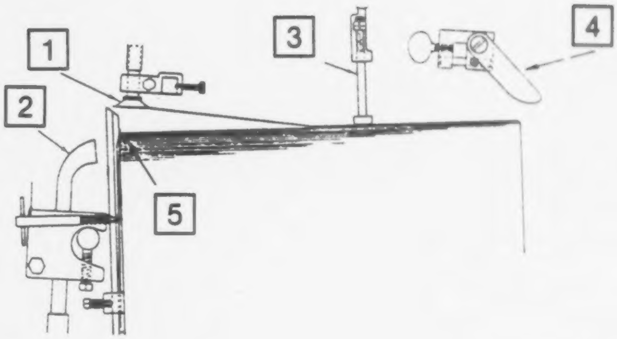
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

EVALUATION ITEMS:

Identify the parts of the feeder by writing the name of the part after the corresponding number.

1. ______________________
2. ______________________
3. ______________________
4. ______________________
5. ______________________



For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 6. The illustration above is of a stream feeder.

____ 7. Feed rollers move the sheet onto the cylinder.

____ 8. The feed table raises automatically.

____ 9. A stream feeder has a push-type side guide.

____10. Most duplicators do not have front stops.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

EVALUATION ITEMS: NAME OF STUDENT: ____________________

SETTING THE PRESS FEEDER

EQUIPMENT:

1. Paper in paper feeder

DID THE STUDENT:	YES	NO
1. Move sheet forward by the hand wheel from its position in paper feeder until it is against the front stops.		
2. Position side guide.		
3. Set wheels/brushes against back of sheet.		
4. Turn hand wheel until sheet is in delivery.		
5. Check to see if side guide pushed/pulled sheet.		

The student has satisfactorily completed the procedure "SETTING THE PRESS FEEDER" according to the steps outlined.

____
Instructor's Signature
(Verifying Satisfactory Completion)

____
Date

LESSON PLAN: 3

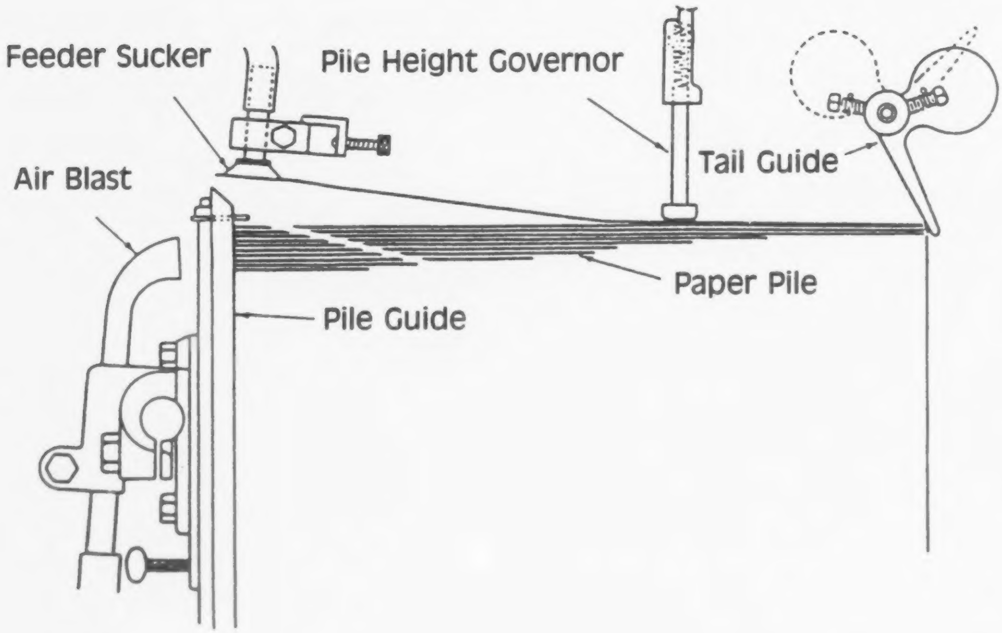
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

ANSWERS TO EVALUATION ITEMS:

1. Feeder sucker
2. Air blast
3. Pile height governor
4. Tail guide
5. Sheet separator
6. F
7. F
8. T
9. F
10. T

Sheet-Fed Feeder


Feeder Sucker
Pile Height Governor
Air Blast
Tail Guide
Paper Pile
Pile Guide

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI: OFFSET PRESS

SCOPE OF UNIT:

The basic operation of the offset press has not changed since the beginning of the lithographic process. Presses have become faster and better but the principle remains the same. This unit covers the operation and safety of a duplicator; however, the terminology remains the same for a large sheet-fed or large web press.

INFORMATION TOPIC: XI-4 OR DEMONSTRATION:

DAMPENING SYSTEM
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify the rollers in the dampening system chain.
2. Identify true statements regarding properties of the fountain solution.
3. State the normal pH of the fountain solution.
4. Test various solutions with pH strips to determine acidity or alkalinity.
5. List the ingredients of the fountain solution.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Typical Dampening System
2. HO 2: pH Solutions
3. HO 3: Testing pH
4. AS 1: Using pH Strips to Test Solutions

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. *Comprehensive Graphic Arts*. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 13, pp. 319-346.

Spence, Wm. P. and David G. Vequist. *Graphic Reproduction*. Peoria, IL: Charles A. Bennett, 1980, chs. 15, 16, pp. 341-422.

Adams, J. Michael and David D. Faux. *Printing Technology*. 2nd ed. North Scituate, MA: Breton Publishers, 1982, chs. 12, 13, pp. 290-338.

REFERENCES:

Walker, John R. *Graphic Arts Fundamentals*. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 6, pp. 128-149.

Cogoli, John E. *Photo-Offset Fundamentals*. Bloomington, IL: McKnight Publishing Company, 1980.

Porter, A. S. *Lithographic Presswork*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1982.

INTRODUCTION:

Maintaining a proper balance of fountain solution and ink is the key to quality printing. A properly set dampening system and the proper fountain solution help keep the necessary balance. An understanding of the pH of the fountain solution is important. Care and maintenance become factors in protecting the nonimage area of the plate.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

OUTLINE: (Key Points)

I. Rollers of the Dampening System (HO 1)

  A. Fountain - steel roller that monitors the amount of solution from the fountain to the ductor roller

  B. Ductor - covered roller that transfers solution from the fountain to the vibrator roller

  C. Vibrator - steel roller that carries solution to the form rollers

  D. Form - one or two covered rollers that apply the solution to the plate to protect the nonimage area of the plate

II. Roller Covering

  A. Molleton - cloth covering for ductor and form rollers that allows the roller to retain more solution in storage

  B. Paper sleeves - sleeves that fit over the ductor and form rollers, and shrink when wet to retain some solution

  C. Paper wrap - paper that is wrapped around ductor and form rollers to retain some solution

  D. Bare back - ductor and form rollers that have no coverings

III. Fountain Solution

  A. pH - measurement of the acidity of fountain solution; should be maintained between 4 and 5.5 (HO 2, HO 3)

  B. Zinc nitrate/phosphoric acid - the part of the fountain solution that protects plate from acids

  C. Gum arabic - the part of the solution that prevents the nonimage of the plate from oxidizing

  D. Water - preferably distilled, use as the vehicle

E. Wetting agent - any of several chemicals, often alcohol, in the solution to break down the water

F. A conductivity meter is used in some operations to measure fountain solution.

IV. Fountain Solution-Related Press Problems

A. Emulsification - emulsification is the absorption of fountain solution into the ink system; some absorption is ideal--too much is a problem

B. Stripping - stripping of ink on metal rollers in the ink chain caused by a fountain solution that is too acidic

C. Scumming - scumming is unwanted ink appearing in the nonimage area of the plate, due mainly to a breakdown of ink/water balance

D. Blinding - inability of the plate to accept ink, usually caused by too much gum arabic in the fountain solution

E. Tinting - too much ink emulsified into the fountain solution, thus pigment of the ink transferred to the plate by dampening system

V. Summary and Conclusion

A. Rollers of the dampening system

B. Roller covering

C. Fountain solution

D. Fountain solution-related press problems

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

INTERACTION ITEMS:

1. How is the amount of fountain solution dispensed from the reservoir?
2. Why are some dampening rollers covered?
3. What happens when too much fountain solution gets to the plate? Not enough?
4. How does ink get on dampening rollers?
5. How does too much acid in fountain solution affect the plate?
6. What causes roller stripping? How is it cured?
7. What is the general range of pH?
8. What are the advantages of each type of dampening cover?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. With the press ready to run, turn off the fountain adjustment, run press, and observe plate.
2. Turn fountain to maximum, run, and observe plate.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

EVALUATION ITEMS:

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 1. The fountain solution protects the nonimage area of the plate.

____ 2. The fountain solution should be alkaline.

____ 3. Alcohol should not affect the pH of the fountain solution.

____ 4. Water with a neutral pH is usually tap water.

Match each dampening problem with the correct definition.

5._____ Emulsification

6._____ Tinting

7._____ Scumming

8._____ Stripping

9._____ Blinding

a. Inability of plate to accept ink

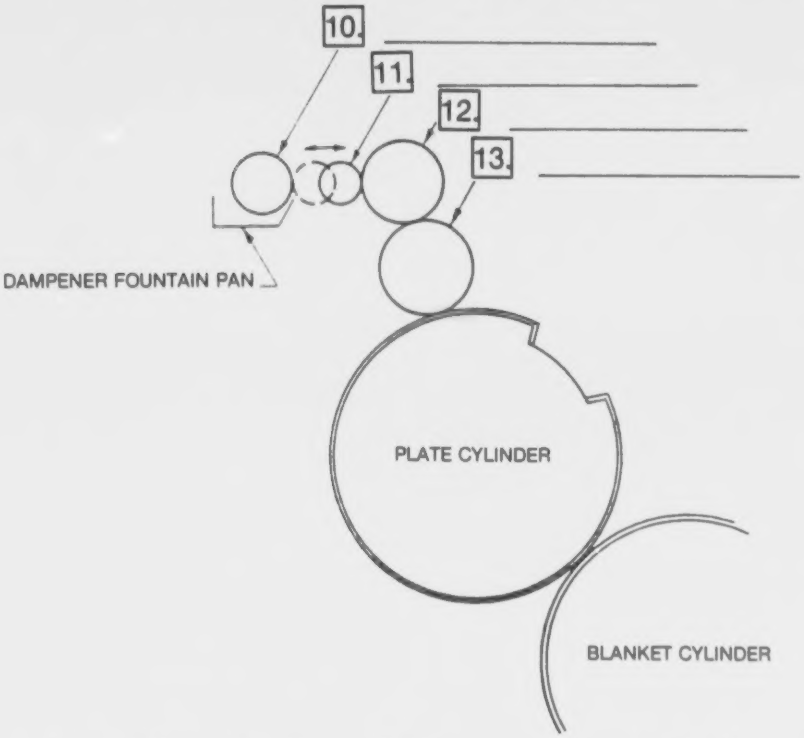
b. Ink not adhering to metal ink rollers

c. Absorption of fountain solution into ink system

d. Unwanted ink appearing in the nonimage area of the plate

e. Ink being absorbed into the dampening system and back to the plate

Identify the rollers in the dampening system chain by writing in the correct names on the illustration below.


10. ____________________
11. ____________________
12. ____________________
13. ____________________
DAMPENER FOUNTAIN PAN
PLATE CYLINDER
BLANKET CYLINDER

14. List the ingredients of the fountain solution.

    a.

    b.

    c.

    d.

15. What is the normal pH of the fountain solution?____________

LESSON PLAN: 4

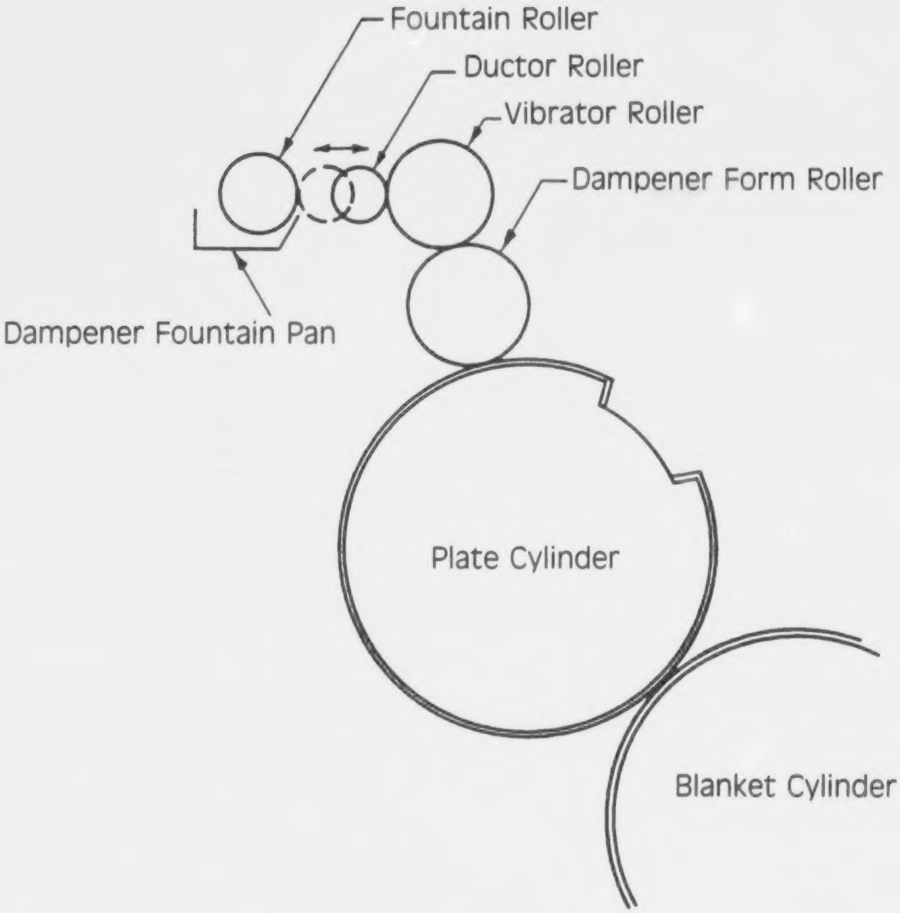
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

ANSWERS TO EVALUATION ITEMS:

1. T
2. F
3. T
4. F
5. c
6. e
7. d
8. b
9. a
10. Fountain roller
11. Ductor roller
12. Vibrator roller
13. Dampener form roller
14. a. Zinc nitrate/phosphoric acid
    b. Gum arabic
    c. Water
    d. Wetting agent
15. Between 4 and 5.5

Typical Dampening System


Fountain Roller
Ductor Roller
Vibrator Roller
Dampener Form Roller
Dampener Fountain Pan
Plate Cylinder
Blanket Cylinder

pH Solutions

There is a variety of fountain solutions available on the market today. With each separate formulation, it is the pH factor that is important to the printer. pH is the measurement of the acidity or alkalinity of a solution. The higher the pH number over 7, the more alkaline the solution.

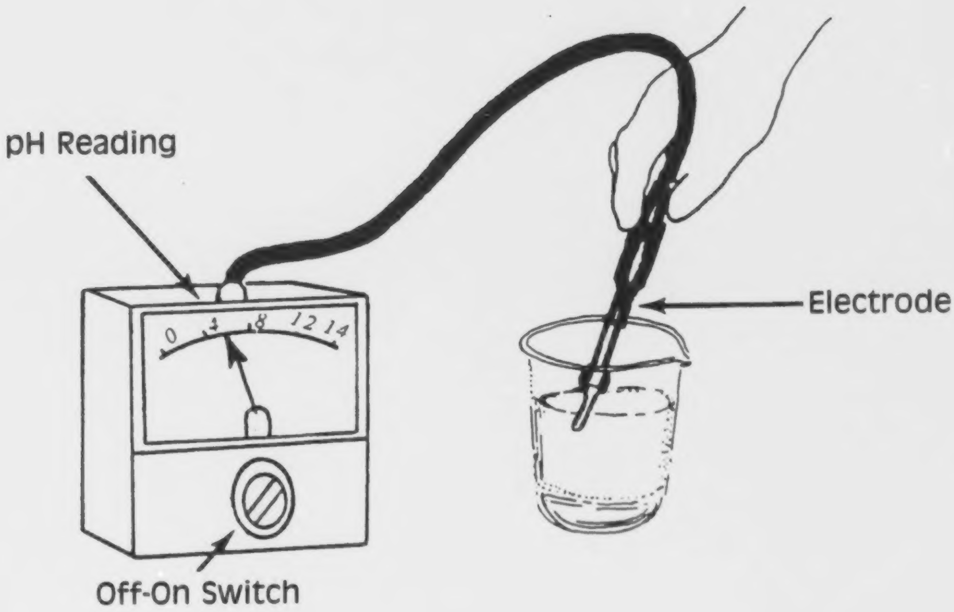
1	2	3	4	5	6	7	8	9	10	11	12	13	14
ACID ←						N	→ ALKALINE						

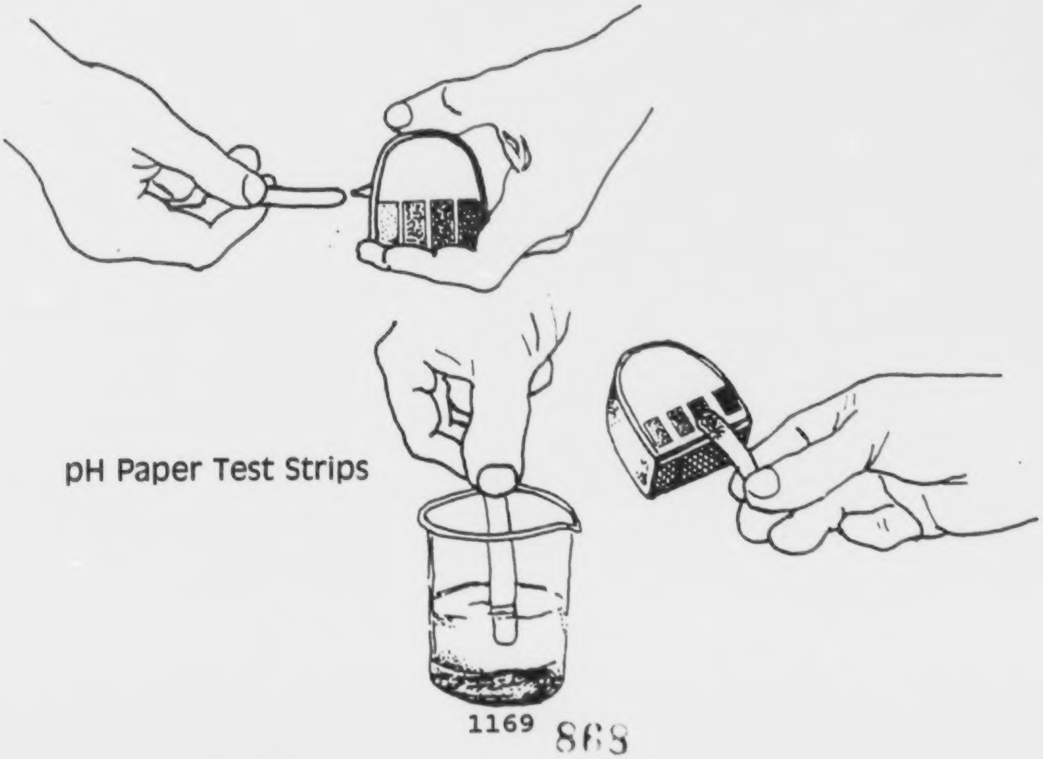
Inks should be run with a fountain solution having a pH as close to neutral as possible. Inks printed with fountain solutions with pH readings that are less acidic will dry faster, harder, and with less press problems such as emulsification, and stripping of ink rollers.

The acidic factor increases rapidly as the pH reading gets lower. For example: A 4.0 pH is ten times as acidic as a solution with a 5.0 pH and a 2.0 pH reading is 1,000 times as acidic as a 5.0.

Formulas for mixing fountain solutions for press must be adjusted to give the proper pH reading. Fountain solution on the press will change in pH value as it runs due to influences of the ink and paper. Check the pH of the fountain solution periodically while running the press and adjust when necessary.

Testing pH


pH Reading
0
4
8
12
14
Electrode
Off-On Switch


pH Paper Test Strips

ASSIGNMENT SHEET 1 - USING pH STRIPS TO TEST SOLUTIONS

Directions: The pH of the fountain solution is critical to good performance and proper ink drying. Use several different liquids such as tap water, distilled water, cola, coffee, fountain solution, and fountain solution with 10% alcohol. Test each solution with a commercial pH strip. Compare the scale and record the results.

1. Mix fountain solution as per directions.
2. Add 10% isopropyl alcohol to one container of fountain solution.
3. Assemble other solutions to be used.
4. Place pH strips in each cup of solution for 30 seconds.*
5. Remove and compare each with pH scale.
6. Record alkaline solutions:

   ____
   ____
   ____

7. Record acidic solutions:

   ____
   ____
   ____

*Directions may vary for different brands of pH strips.

ANSWERS TO ASSIGNMENT SHEET 1 - USING pH STRIPS TO TEST SOLUTIONS

This assignment should be evaluated on an individual basis. Answers will depend on what liquids the student tested and the alkaline or acidic properties of each.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

SCOPE OF UNIT:

The basic operation of the offset press has not changed since the beginning of the lithographic process. Presses have become faster and better but the principle remains the same. This unit covers the operation and safety of a duplicator; however, the terminology remains the same for a large sheet-fed or large web press.

INFORMATION TOPIC: XI-5 OR DEMONSTRATION:

INKING SYSTEM
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify types of rollers in the ink train of an offset press.
2. Identify ingredients of ink.
3. Identify types of ink.
4. Identify problems that may occur as a result of a malfunctioning inking system.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Inking System/Ink Fountain
2. HO 2: Proper Maintenance of Rollers
3. HO 3: Methods of Ink Drying

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 13, pp. 319-346.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, chs. 15, 16, pp. 341-422.

Adams, J. Michael and David D. Faux, Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, chs. 12, 13, pp. 290-338.

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Cogoli, John E. Photo-Offset Fundamentals. Bloomington, IL: McKnight Publishing Company, 1980.

Porter, A. S. Lithographic Presswork. Pittsburgh, PA: Graphic Arts Technical Foundation, 1982.

INTRODUCTION:

The inking system is designed to place a very thin layer of ink on the image area. The proper ink for the paper is just as important as the ink train itself. The inking system has to be in harmony with the dampening system to produce the printed page.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

OUTLINE: (Key Points)

I. Ink Rollers (HO 1)

   A. Function - the function of the rollers is to break down the ink into a fine layer and apply it to the plate

   B. Fountain - the storage area for ink; it has adjustable keys to regulate the amount of ink going into the roller system

   C. Fountain roller - takes a monitored amount of ink from fountain and transfers it to the ductor roller

   D. Ductor roller - transfers ink from the fountain to the main chain of rollers in the train; adjustable to permit more ink to get to the ink train

   E. Intermediate rollers - small steel rollers called idlers, rider or distributor rollers that help spread out the ink layer

   F. Oscillators - larger rollers that break down the ink and move it laterally as they turn

   G. Form rollers - two, three, or four rollers that transfer ink from chain to plate; they usually vary in size to assist in smoothing out the ink transfer

   H. Idler roller - roller that rides on form roller

II. Roller Maintenance (HO 2)

   A. Adjustment

      1. To check for proper setting, drop ink train onto dry plate and raise.

      2. Stripe should be 3/16" wide and even across plate.

      3. See press manual for proper method of setting rollers.

B. Copperize - copperizing steel rollers to prevent stripping of ink caused by too much acid in fountain solution

C. Clean rollers - rollers should be cleaned daily to prevent glazing and hickies

III. Troubleshooting

A. Hickies - particles of dried ink that lodge on the plate and print as halos

B. Misting - improper ingredients in the ink causing the ink to separate and fly off the ink train

C. Picking - tack of the ink is greater than strength of paper and pulls fibers off the paper

D. Mottling - a spotty or uneven ink coverage of a solid

E. Chalking - a pigment rubs off because vehicle has absorbed too rapidly into the paper

F. Piling - the build-up of ink on the rollers but not transferring to the plate

G. Trapping - where the same amount of ink transfers to a previously printed surface as it does to a blank sheet

IV. Offset Ink

A. Ingredients of ink

1. Vehicle - the main body of the ink; carries other ingredients to the paper; usually made of varnish, oils, and resins

2. Pigment - the coloring materials in the ink; black pigment is mostly carbon; color inks use chemical dyes; yellow ink also contains lead

3. Modifiers - additives mixed into the ink to create a special purpose; dryers, waxes, starches, extenders, and resistants are some of the modifiers

B. Types of ink

1. Opaque - inks, when printed on top of each other, do not show the bottom color

2. Transparent ink - transparent inks show the bottom color and are used in process color work to obtain all hues necessary for the proper color tones

3. Transparent white - transparent white is used in mixing inks to provide the proper shade of a color

4. Process inks - specified colors of magenta, cyan and yellow which, along with black, are used for process color work

C. Drying methods (HO 3)

1. Absorption - nondrying oils penetrate the paper and dry as they are absorbed

2. Oxidation - the vehicle absorbs oxygen from the air and becomes solid

3. Polymerization - oxygen sets up a reaction that turns small molecules into a gel, then into large molecules that harden

4. Resin-solvent - the combination resin-solvent vehicle releases the solvent causing the resin to dry; process can be speeded by heating the printed vehicle

5. Moisture-set - a glycol-resin vehicle is sprayed with water or steam; glycol mixes with water and is absorbed by the paper and the resin precipitates as a solid film

6. Resin-oil - a combination of absorption and oxidation to achieve a quick-setting vehicle

7. Cold set - a wax and resin vehicle is heated, then becomes solid as heat is radiated away from the vehicle as it cools

D. Mixing ink - using the proper amount of certain colors to obtain a variation of the main color; ink mixing scale and ink manufacturer's formula are needed for good color matching

E. Care of ink

1. Dried ink - should be scraped off the top daily to prevent dried ink from getting into the ink train and causing hickies

2. Opening ink - keep the ink in the can level to prevent ink from drying in gouged areas causing waste of ink

3. Drying - do not leave ink on press overnight regularly as ink will accumulate dust and most ink will dry causing hickies

V. Summary and Conclusion

A. Ink rollers

B. Roller maintenance

C. Troubleshooting

D. Offset ink

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

INTERACTION ITEMS:

1. Why are some ink rollers steel and some rubber?
2. What is the purpose of the ink train?
3. Why are the form rollers of different diameters on larger presses?
4. Why are there so many rollers in the ink train?
5. How can a single area of the plate receive more ink than another area?
6. What happens when too much ink gets into the train?
7. What happens when too little ink gets into the train?
8. If the rollers are set too light, what results?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. With the press inked and a plate on the press, manually drop the ink form rollers onto the plate, then raise them back up. Turn the press and observe the ink stripe on the plate. What adjustments need to be made?

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

EVALUATION ITEMS:

Match the term on the left to the correct definition or description on the right by writing the letter in the blank.

1._____ Pigment

2._____ Oscillators

3._____ Form

4._____ Hickies

5._____ Modifier

6._____ Black

7._____ Vehicle

8._____ Idler

9._____ Ductor

10._____ Transparent

a. Carbon is used in the manufacture of the color of ink

b. Roller that rides on form roller

c. Particles of dried ink that lodge on plate

d. Rollers that transfer ink to plate

e. Driers, extenders, waxes

f. Rollers that move ink laterally in the ink train

g. The main body of ink

h. Adjustable to allow more ink to get to the ink train

i. The part of the ink that contains the color

j. Ink must be this when using process colors

LESSON PLAN: 5

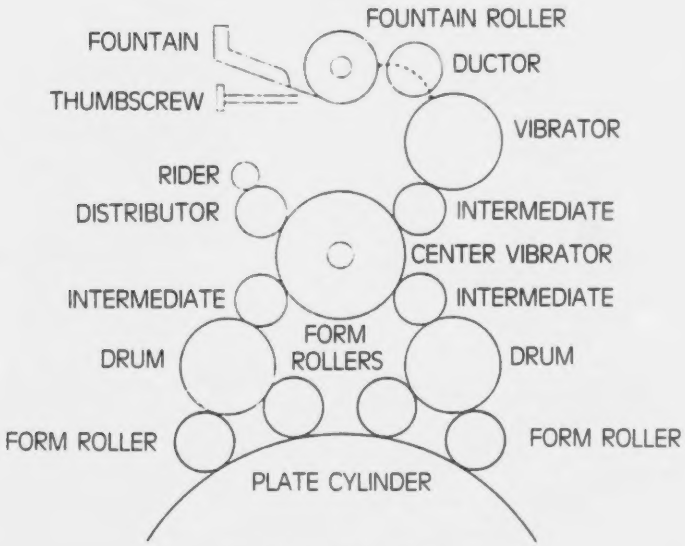
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

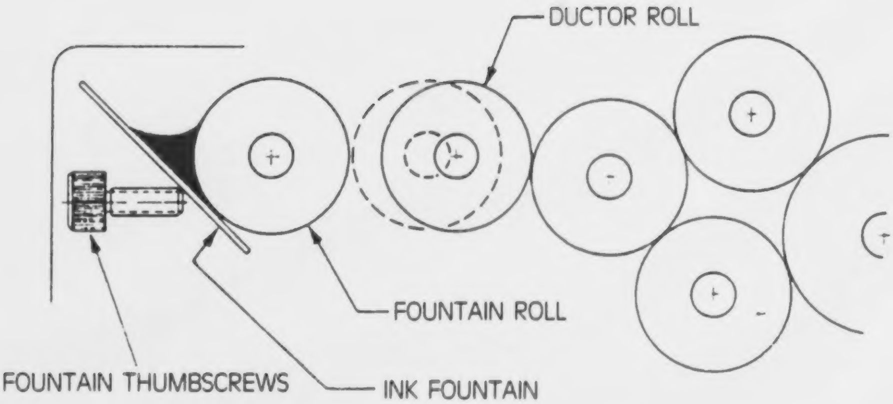
ANSWERS TO EVALUATION ITEMS:

1. i
2. f
3. d
4. c
5. e
6. a
7. g
8. b
9. h
10. j

Inking System/Ink Fountain


FOUNTAIN ROLLER
FOUNTAIN
DUCTOR
THUMBSCREW
VIBRATOR
RIDER
DISTRIBUTOR
INTERMEDIATE
CENTER VIBRATOR
INTERMEDIATE
INTERMEDIATE
FORM ROLLERS
DRUM
DRUM
FORM ROLLER
FORM ROLLER
PLATE CYLINDER

Inking System


DUCTOR ROLL
FOUNTAIN ROLL
FOUNTAIN THUMBSCREWS
INK FOUNTAIN

Ink Fountain

Proper Maintenance of Rollers

Proper Selection

The type of roller required varies with its function. The roller also varies with the kind of ink, press speed, and so forth. Roller manufacturers are continually developing new rubber and urethane compounds to broaden the types of rollers available.

Storage

Rollers must always be stored away from dampness, heat, sunlight, and ozone generated by electric motors, switch gears, or generators. Do not store rollers on open racks or in congested areas where they may be damaged. Special care must be taken in storing so that they are supported only by the roller shaft. The roller should never be left in contact with anything that will cause a depression or a mark on the roller surface. Rollers should be wrapped in paper or covered.

Spares

Always have spare rollers on hand– a quarter of a set for each press is a good number. When new or reconditioned rollers are received, they should be put to immediate use and the ones on the press removed, cleaned properly and thoroughly, and stored. Spares should be rotated with the rollers on the presses at least every six months.

Setting

Unnecessary down-time may be caused by improper roller setting. All rollers should be set very lightly when cold because when in use frictional heat and absorption of ink expands them. After the press reaches operating temperature in 20 or 30 minutes, roller settings should be rechecked and reset if necessary. Rollers should be set as lightly as possible to transfer ink to the plate.

Wash-up

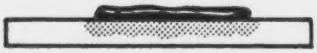
Press operators should check rollers daily, watching for accumulated ink/gum glaze. Stripping, streaking, hickies, emulsification, excessive plate abrasion, ink glaze, and gum glaze are some of the problems caused by improper wash-up. Preventing a build-up of ink/gum glaze is far superior to attempting to remove it after it has occurred. The ink/gum glaze that is imbedded in the roller is impregnated with pigment, wax, varnish, lint, and acid from the fountain and is difficult to completely remove.

Reconditioning

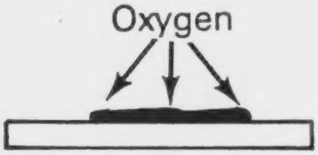
If the surface of the rollers becomes hard and glazed, it is time for roller reconditioning. Reconditioning rollers at regular intervals maintains quality reproduction and extends the life of the rollers.

HO 3

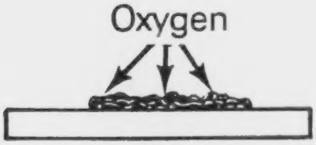
Methods of Ink Drying



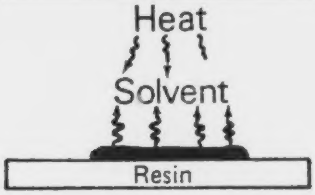
Absorption:
Nondrying oils penetrate the paper and dry as they are absorbed.



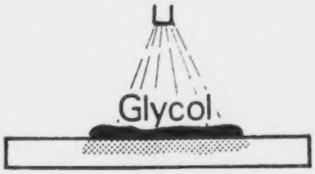
Oxidation:
The vehicle absorbs oxygen from the air and becomes solid.



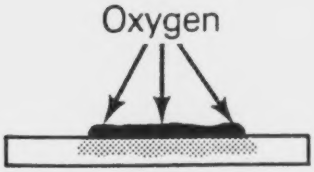
Polymerization:
Oxygen sets up a reaction that turns small molecules into a gel, then into large molecules that harden.



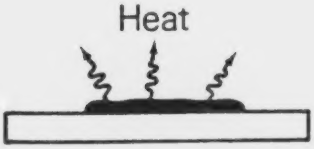
Resin-Solvent:
The combination resin-solvent vehicle releases the solvent causing the resin to dry; process can be speeded by heating the printed vehicle.



Moisture-Set:
A glycol-resin vehicle is sprayed with water or steam; glycol mixes with water and is absorbed by the paper and the resin precipitates as a solid film.



Resin-Oil:
A combination of absorption and oxidation occurs to achieve a quick-setting vehicle.



Cold Set
A wax and resin vehicle is heated, then becomes solid as heat is radiated away from the vehicle as it cools.

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

SCOPE OF UNIT:

The basic operation of the offset press has not changed since the beginning of the lithographic process. Presses have become faster and better but the principle remains the same. This unit covers the operation and safety of a duplicator; however, the terminology remains the same for a large sheet-fed or large web press.

INFORMATION TOPIC: XI-6 OR DEMONSTRATION:

PRINTING UNIT
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify cylinders of the printing unit.
2. State the direction of movement of cylinders of the printing unit.
3. Determine the ability of a press to perfect by observing its configuration.
4. Determine the direction of an image on a blanket by observing the press configuration.
5. Determine the method of sheet delivery by observing the press configuration.
6. Determine packing for a plate cylinder.
7. Determine packing for a blanket cylinder.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Cylinder Configurations
2. HO 2: Multicolor Configurations
3. HO 3: Newspaper Web

4. HO 4: Transfer Cylinders
5. HO 5: Cylinder Undercut
6. AS 1: Determining Packing for Plate and Blanket Cylinders

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. *Comprehensive Graphic Arts*. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 13, pp. 319-346.

Spence, Wm. P. and David G. Vequist. *Graphic Reproduction*. Peoria, IL: Charles A. Bennett, 1980, chs. 15, 16, pp. 341-422.

Adams, J. Michael and David D. Faux, *Printing Technology*. 2nd ed. North Scituate, MA: Breton Publishers, 1982, chs. 12, 13, pp. 290-338.

REFERENCES:

Walker, John R. *Graphic Arts Fundamentals*. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 6, pp. 128-149.

Cogoli, John E. *Photo-Offset Fundamentals*. Bloomington, IL: McKnight Publishing Company, 1980.

Porter, A. S. *Lithographic Presswork*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1982.

INTRODUCTION:

There are many press configurations, each designed to meet a particular need. This unit will concentrate on the most popular single color and multicolor units.

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

OUTLINE: (Key Points)

I. Printing Unit Configurations (HO 1)

   A. Single color - printing one color with one pass through the press

      1. Three cylinders - a separate cylinder for the plate, blanket, and impression

      2. Two cylinders - the plate and the impression are on a larger single cylinder, while the blanket is on a smaller cylinder

   B. Multicolor - each color is put on the paper by a separate but connected unit of the press (HO 2)

      1. Common blanket - each color is put on the blanket separately; however, two colors are transferred to the paper from a single blanket

      2. Common impression - paper is wrapped around a larger common impression cylinder and each color is printed separately

   C. Perfecting - printing both sides of the sheet on a single pass through the press

      1. Blanket-to-blanket - the blanket on one side of the sheet serves as the impression cylinder for the other side

      2. Convertible - prints one side of paper in one unit, then turns paper over to print other side in next unit; this configuration has the option of printing two colors on one side by not turning paper over

   D. Web - printing on a roll of paper (HO 3)

      1. Blanket-to-blanket perfecting - same as sheet-fed perfecting

      2. In-line open press - same as multiple color except transfer cylinders are not needed to transfer sheet

3. Drum press - similar to common impression except sheet is turned over and enters another common impression unit

II. Cylinders

A. Plate cylinder - cylinder that holds the right reading plate; cylinder moves to contact dampening prior to ink, usually in a counterclockwise direction

B. Blanket cylinder - cylinder that holds the blanket which receives the wrong reading impression from the plate; press moves in clockwise direction on bearers that ride on bearers on the plate cylinder

C. Impression cylinder - the impression cylinder has grippers that hold the paper throughout the printing operation; it holds the paper as ink is transferred from the blanket

D. Skeleton cylinder - a cylinder only on chain deliveries that serves as a guide for the paper

E. Transfer cylinders - cylinders that change the direction of the paper prior to entering another printing unit (HO 4)

III. Adjustments (HO 5)

A. Plate/blanket - the plate and the blanket should be packed to about two to three thousandths above the cylinder bearers

B. Blanket/impression - blanket cylinder should be packed about one or two thousandths above the cylinder bearers; the impression cylinder is adjustable to the blanket

C. Packing - the amount of material placed under the plate and blanket to bring the cylinder above the bearers

1. Plate - most duplicators do not have bearers and packing is not necessary; however, larger presses are undercut about .016 to accommodate the variety of plates that are available; plate and packing should be .017 or .018

2. Blanket - most cylinders are undercut about .075 to accommodate the variety of blankets available; packing should be sufficient to bring the thickness to .001 or .002 above the bearers

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IV. Blanket Repair

   A. Patching - using any of several commercial products to swell the surface of the blanket to allow a non-printing area to transfer ink

   B. Repairing - using an onionskin paper placed underneath the blanket to allow low spots in the blanket to receive ink from the plate

V. Summary and Conclusion

   A. Printing unit configurations

   B. Cylinders

   C. Adjustments

   D. Blanket repair

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

INTERACTION ITEMS:

1. What cylinder adjustment is necessary for various thicknesses of paper?

2. How is the adjustment made? Which cylinder changes?

3. How is the impression cylinder kept clean?

4. If paper does not feed, why is there no image on the impression cylinder?

5. How is the impression cylinder driven?

6. Why is there an odd number of transfer cylinders?

7. How do some perfectors turn the sheet over to print the second side?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Change the impression adjustment of the press and study the results on the printed sheet.

2. Check the grippers on the impression cylinder when the sheet transfers to the delivery grippers. What happens if there is play at transfer? What occurs if the delivery is a chute?

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

EVALUATION ITEMS:

Study the diagram below and identify the cylinders and describe their direction of movement (clockwise or counterclockwise).

	Cylinder		Direction Cylinder Moves
1.	A -	4.	A -
2.	B -	5.	B -
3.	C -	6.	C -

7. What is the large unlabeled cylinder called? ______________

8. Does the press perfect? ______________

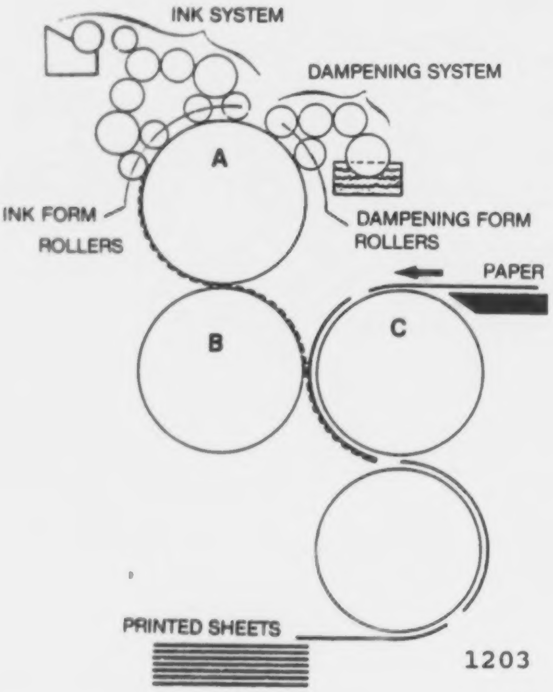
9. Is the image on the blanket: right reading or wrong reading? ______________

10. Are the sheets being delivered: (indicate correct answer with a check ✓)

printed side up ________

printed side down ______

printed both sides ______


INK SYSTEM
DAMPENING SYSTEM
A
INK FORM ROLLERS
DAMPENING FORM ROLLERS
PAPER
B
C
PRINTED SHEETS

LESSON PLAN: 6

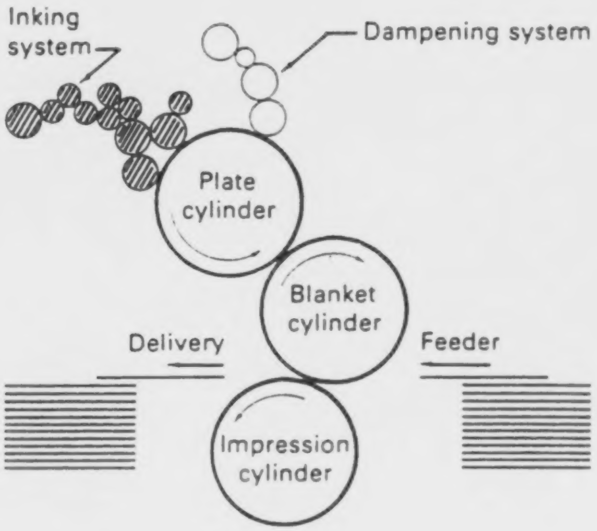
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

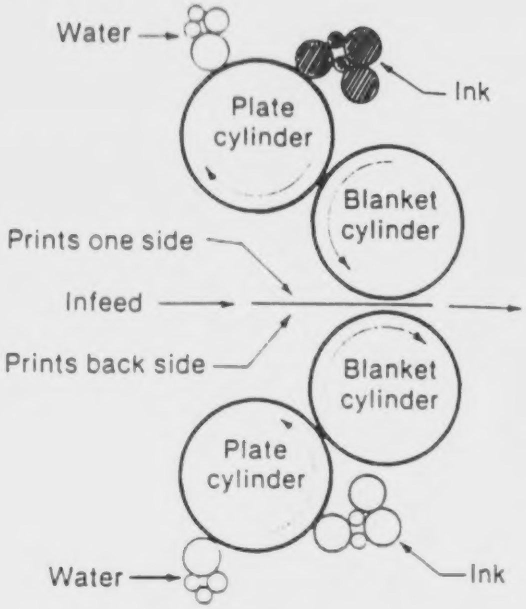
ANSWERS TO EVALUATION ITEMS:

1. Plate
2. Blanket
3. Impression
4. Counterclockwise
5. Clockwise
6. Counterclockwise
7. Skeleton
8. No
9. Wrong reading
10. Printed side up

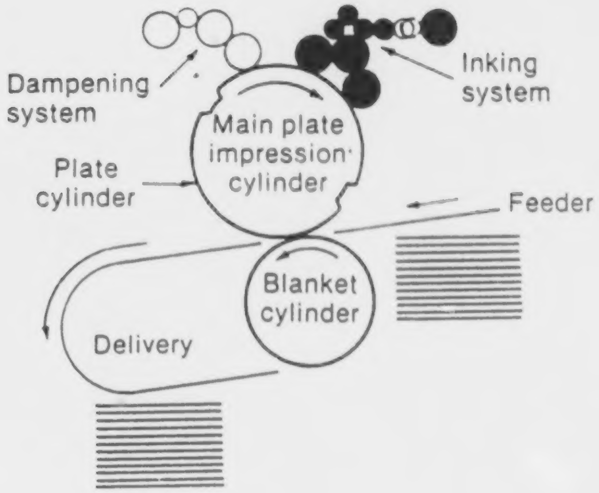
Cylinder Configurations


Inking system
Dampening system
Plate cylinder
Blanket cylinder
Delivery
Feeder
Impression cylinder

Three-Cylinder Configuration


Water
Ink
Plate cylinder
Blanket cylinder
Prints one side
Infeed
Prints back side
Blanket cylinder
Plate cylinder
Water
Ink

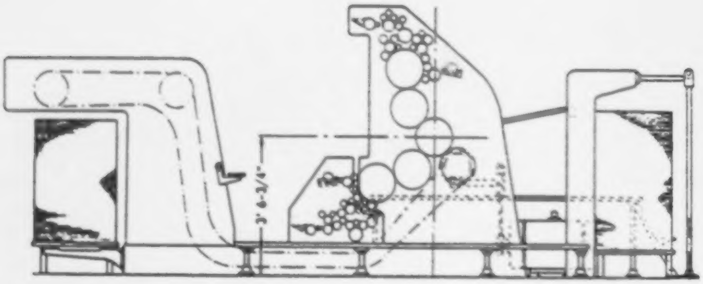
Blanket-To-Blanket Configuration


Dampening system
Inking system
Main plate impression cylinder
Plate cylinder
Feeder
Blanket cylinder
Delivery

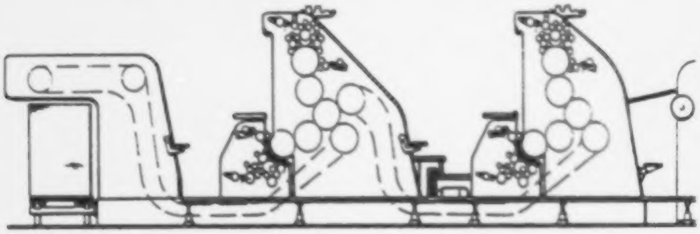
Two-Cylinder Configuration

HO 2

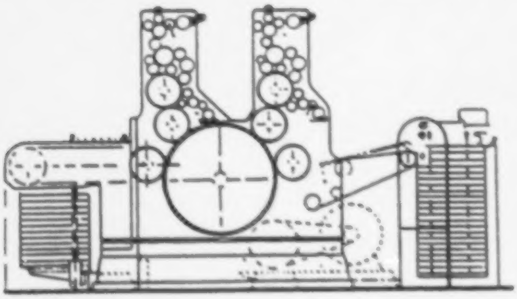
Multicolor Configurations



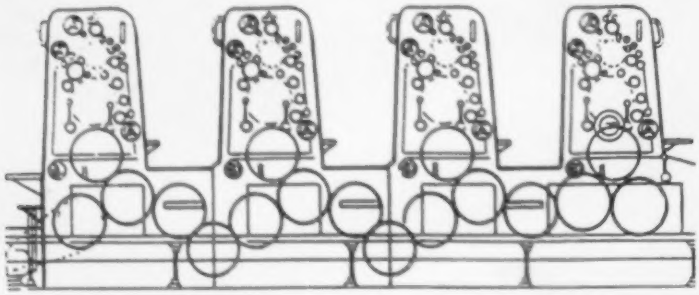
Single Impression Cylinder Two-Color Press



Two Two-Color Units with an Endless Chain

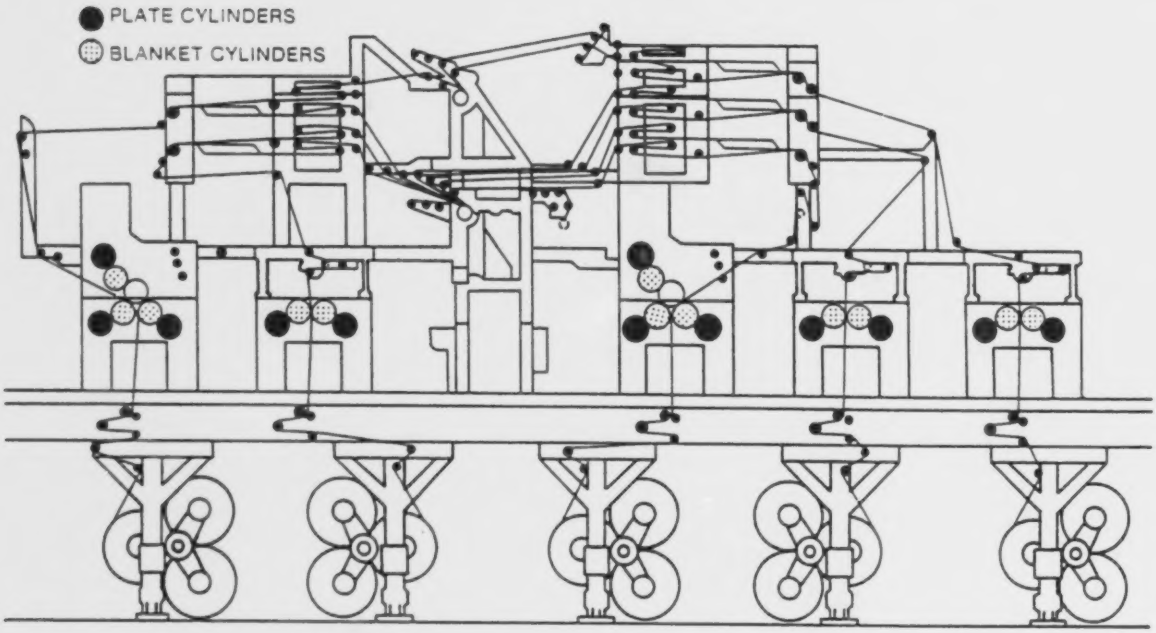


Two-Color Press with Common Impression Cylinder



Single Transfer System Between Units

Newspaper Web


● PLATE CYLINDERS
▨ BLANKET CYLINDERS

Side view of a large web-offset lithography press used in newspaper production; paper rolls are on the lowest level, printing units on the middle level, and the dryer and folder sections at the top.

Transfer Cylinders

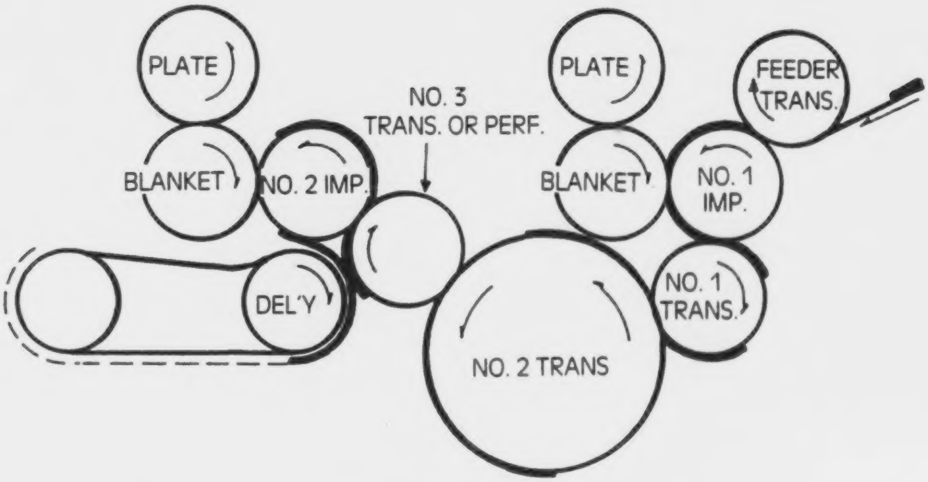
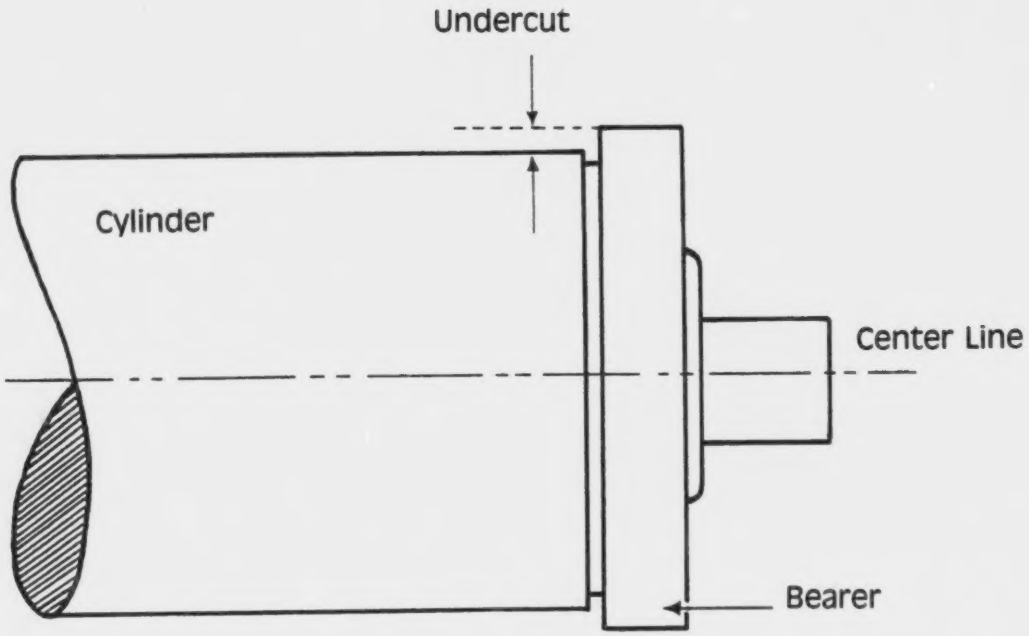


PLATE
BLANKET
NO. 2 IMP.
NO. 3
TRANS. OR PERF.
PLATE
FEEDER
TRANS.
BLANKET
NO. 1
IMP.
DEL'Y
NO. 1
TRANS.
NO. 2 TRANS

HO 5

Cylinder Undercut


Undercut
Cylinder
Center Line
Bearer

ASSIGNMENT SHEET 1 - DETERMINING PACKING FOR PLATE AND BLANKET CYLINDERS

Directions: This assignment sheet will help you review and check your understanding of the information presented in this lesson. Complete the following exercises as directed.

A. The plate cylinder on presses with bearers is usually undercut to allow for varying thicknesses of plates (usually about .016). Packing should bring the plate to .002 over bearers. This assignment is to determine the amount of packing necessary to accomplish this.

1. Plate cylinder is undercut .017. Plate is .009 thick. Packing is in .002, .003, and .005 sheets. What packing is needed under the plate? (Use as few sheets as possible.)

B. The blanket cylinder is also undercut, normally from .065 to .085. This is to accommodate a variety of thicknesses of blankets.

1. Figure the packing for a cylinder that is undercut .078. Blanket measures .066. (Overpack the blanket .002.) What packing is necessary? (Use as few sheets as necessary.)

ANSWERS TO ASSIGNMENT SHEET 1 - DETERMINING PACKING FOR PLATE AND BLANKET CYLINDERS

A.1.

UNDERCUT	.017
OVER BEARERS	.002
	.019
PLATE	- .009
PACKING NEEDED	.010

TWO SHEETS OF .005 PACKING* SHOULD BE USED.

B.1.

UNDERCUT	.078
OVERPACK	.002
	.080
BLANKET	- .066
PACKING	.014

2Sheets .005
2 Sheets .002

(*) PACKING UNDER PLATE IS USUALLY CUT ABOUT 1/4" SHORT IN BOTH DIRECTIONS. IF PACKING MATERIAL IS NOT AVAILABLE, USE A COATED STOCK.

LESSON PLAN: 7

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

SCOPE OF UNIT:

The basic operation of the offset press has not changed since the beginning of the lithographic process. Presses have become faster and better but the principle remains the same. This unit covers the operation and safety of a duplicator; however, the terminology remains the same for a large sheet-fed or large web press.

INFORMATION TOPIC: XI-7 AND DEMONSTRATION: XI-7

DELIVERY SYSTEMS
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify types of delivery systems used on offset presses.
2. Identify auxiliary functions associated with offset press delivery systems.
3. Set up and adjust jogger.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Types of Delivery
2. Paper
3. Offset press with jogger

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. *Comprehensive Graphic Arts*. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 13, pp. 319-346.

Spence, Wm. P. and David G. Vequist. *Graphic Reproduction*. Peoria, IL: Charles A. Bennett, 1980, chs. 15, 16, pp. 341-422.

Adams, J. Michael and David D. Faux. *Printing Technology*. 2nd ed. North Scituate, MA: Breton Publishers, 1982, chs. 12, 13, pp. 290-338.

REFERENCES:

Walker, John R. *Graphic Arts Fundamentals*. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 6, pp. 128-149.

Cogoli, John E. *Photo-Offset Fundamentals*. Bloomington, IL: McKnight Publishing Company, 1980.

Porter, A. S. *Lithographic Presswork*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1982.

INTRODUCTION:

The delivery system on large offset presses is usually a chain delivery. On duplicators, a chute delivery is often used because it is less expensive. On occasion the delivery system will deliver directly into another printing unit or another operation such as thermography, collator or even folding. The delivery system also contains auxiliary operations that aid in the production of the job. These often include scoring, numbering and perforating. Attachments that eliminate or help control delivery problems include set-off spray, static, and de-curl bars.

LESSON PLAN: 7

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

OUTLINE: (Key Points)

I. Types of Delivery (HO 1)

  A. Chute - type of delivery system used on duplicators that holds approximately a ream of stock

    1. Ejector rollers - rollers that guide the sheet squarely into the jogger

    2. Tinsel - often used on duplicators to retard static on paper at the chute

  B. Chain - type of delivery where the sheet is carried by grippers and stacked in a pile

  C. Bindery on-line - type of delivery where sheet is carried, usually by belts, into one of several bindery operations

  D. Multicolor - delivering the sheet from one printing unit to another without stocking the sheet; transfer cylinder moves sheet to beginning of the next unit

II. Skeleton Wheel - wheel used to help guide the sheet to the pile in a chain-type delivery

III. Auxiliary Delivery Functions

  A. Set-off spray - powder sprayed above printed sheets to prevent ink from adhering to the bottom of the top sheet

  B. Jogger - a guide on the delivery to form the sheets into a neat pile

  C. Anti-curl bar - a bar that prevents sheets from curling near the tail of the printed sheet

  D. Dryers - heat applied at the delivery to allow the ink to set prior to jogging

  E. Inspection - obtaining a printed sheet for inspection from the delivery system without stopping the press

IV. Procedure for Setting Up and Adjusting the Jogger

NOTE: Because most sheets require a post-press operation, the jogger on the chain delivery becomes a time saver. In order to prevent a second lengthy jogging process in the bindery section, it is important that the jogger be set correctly during the press set-up. Presses that have a chute delivery usually have a jogger also.

A. After setting up the feeder inch a sheet through the press.

B. Stop sheet when jogger is at the smallest setting, loosen jogger guides.

C. Move guides to 1/16" outside paper on sides and back.

D. Lock jogger guides.

E. Continue to inch the press until the jogger has opened and closed.

F. Check jogger and adjust if necessary.

V. Summary and Conclusion

A. Types of delivery

B. Skeleton wheel

C. Auxiliary delivery functions

D. Procedure for setting up and adjusting the jogger

LESSON PLAN: 7

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

INTERACTION ITEMS:

1. Why would a press be on-line to another operation?
2. How many sets of grippers are there on a chain delivery?
3. What type of jobs are ideal for a chute delivery?
4. The chain grippers receive the sheet from which cylinder?
5. The transfer cylinder performs what operation?
6. How can inspection sheets be obtained from the chain delivery?
7. How does the set-off spray function?
8. What occurs if static is present at the delivery?
9. What can be done to retard static?
10. How does the de-curl bar work?
11. What kinds of paper create delivery problems?
12. What problems can be caused by the ejector wheels?
13. What kinds of press dryers are there?
14. What types of problems do dryers present?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Determine how many sheets of bond paper can be safely handled in a chute delivery.
2. Compare down-time between chute delivery and chain delivery on 3,000 sheets of bond paper.
3. Run coated paper without spray. Activate powder and run more coated paper. Compare sheets for static and set-off.
4. Run different weights of paper on a chain delivery. Does light weight paper or heavy paper create more problems?
5. Repeat #4 on chute delivery.

LESSON PLAN: 7

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

EVALUATION ITEMS:

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 1. The chute delivery is usually found on a duplicator.

____ 2. The chain delivery grippers receive the sheet from the blanket cylinder.

____ 3. The skeleton cylinder helps control the sheet through delivery.

____ 4. Ejector wheels should run through the center of the sheet.

____ 5. A transfer cylinder is usually found on a single-color press.

____ 6. Set-off spray allows air between the sheets.

____ 7. Tinsel can be used to help combat static.

____ 8. Heat helps drying and helps control static.

____ 9. The jogger can be adjusted during the press run.

____10. Inspection sheets can be safely taken from the jogger.

LESSON PLAN: 7

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

EVALUATION ITEMS: NAME OF STUDENT: ____________________

SETTING UP AND ADJUSTING THE JOGGER

EQUIPMENT:

1. Paper
2. Offset press with jogger

DID THE STUDENT:	YES	NO
1. After setting up the feeder, inch a sheet through the press		
2. Stop sheet when jogger is at the smallest setting, loosen jogger guides.		
3. Move guides to 1/16" outside paper on sides and back.		
4. Lock jogger guides.		
5. Continue to inch the press until the jogger has opened and closed.		
6. Check jogger and adjust if necessary.		

The student has satisfactorily completed the procedure "SETTING UP AND ADJUSTING THE JOGGER" according to the steps outlined.

____
Instructor's Signature
(Verifying Satisfactory Completion)

____
Date

LESSON PLAN: 7

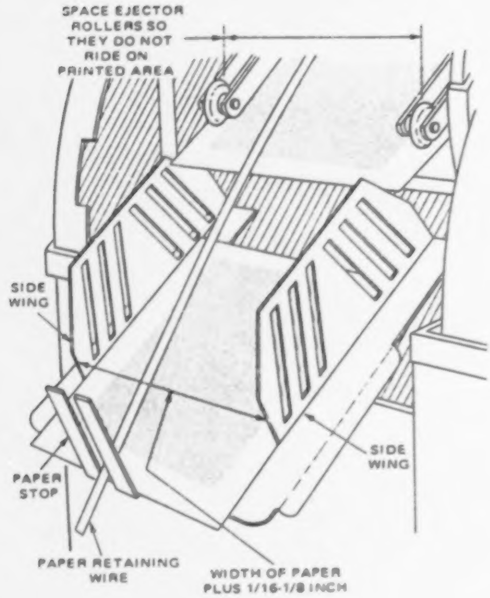
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

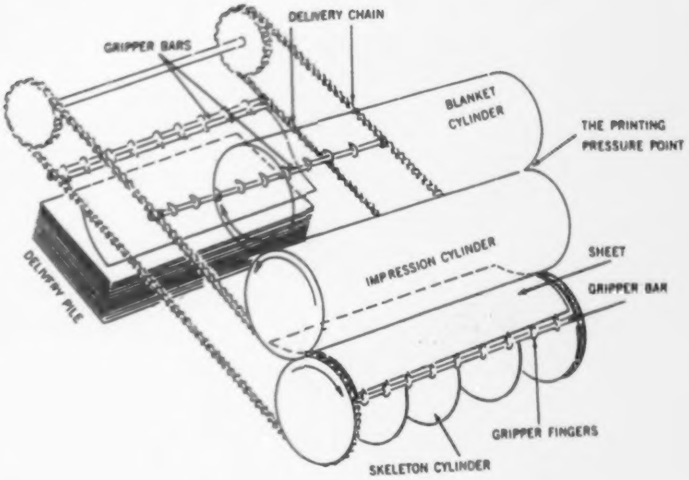
ANSWERS TO EVALUATION ITEMS:

1. T
2. F
3. T
4. F
5. F
6. T
7. T
8. T
9. F
10. T

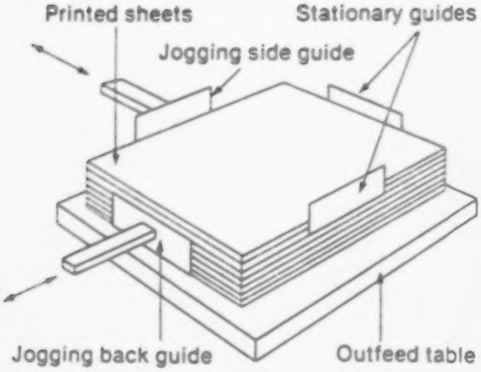
Types of Delivery


SPACE EJECTOR ROLLERS SO THEY DO NOT RIDE ON PRINTED AREA
SIDE WING
SIDE WING
PAPER STOP
PAPER RETAINING WIRE
WIDTH OF PAPER PLUS 1/16-1/8 INCH

Chute Delivery


GRIPPER BARS
DELIVERY CHAIN
BLANKET CYLINDER
THE PRINTING PRESSURE POINT
DELIVERY PILE
IMPRESSION CYLINDER
SHEET
GRIPPER BAR
GRIPPER FINGERS
SKELETON CYLINDER

Chain Delivery Showing Skeleton Cylinder


Printed sheets
Stationary guides
Jogging side guide
Jogging back guide
Outfeed table

Delivery Jogger

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

SCOPE OF UNIT:

The basic operation of the offset press has not changed since the beginning of the lithographic process. Presses have become faster and better but the principle remains the same. This unit covers the operation and safety of a duplicator; however, the terminology remains the same for a large sheet-fed or large web press.

INFORMATION TOPIC: XI-8 AND DEMONSTRATION: XI-8

PRESS OPERATION
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify true statements related to make-ready operations.
2. Identify true statements related to press clean-up.
3. Identify true statements related to adjustments.
4. Set up and operate the offset press.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: The Offset Press
2. Offset press with chain delivery

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 13, pp. 319-346.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, chs. 15, 16, pp. 341-422.

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, chs. 12, 13, pp. 290-338.

REFERENCES:

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 6, pp. 128-149.

Cogoli, John E. Photo-Offset Fundamentals. Bloomington, IL: McKnight Publishing Company, 1980.

Porter, A. S. Lithographic Presswork. Pittsburgh, PA: Graphic Arts Technical Foundation, 1982.

INTRODUCTION:

This lesson has one basic aim--operating the press. Review the previous areas in this unit for procedures and adapt them to the press you will operate. Remember that lesson 1, safety, is the most important. Consult your teacher and press manual for additional information you will need.

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

OUTLINE: (Key Points)

I. Press Areas (HO 1)

  A. Feeder

  B. Dampening

  C. Inking

  D. Printing unit

  E. Delivery

II. Make-ready

  A. Positioning paper - adjusting feeder and feed table to give the operator the proper margin

  B. Gripper margin - adjustment in gripper margin is made by changing the relationship of the plate and blanket cylinders

  C. Ink/water balance - the critical part of the offset operation, maintaining the proper balance; fewer press problems occur when dampening rollers are too dry rather than too wet

  D. Delivery - tracking roller in the printing, stock curling from too much water and improper jogger guides are problems that need to be addressed

  E. Registration - prior to and during the press run, registration must be checked to determine that position of copy on sheet does not change; use of registration marks on the plate aid in registration process

  F. Inspection - sheets should be checked periodically during the press run for registration, color density, and ink problems

III. Press Clean-Up

  A. Fountain solution - solution should be drained from fountain at end of day to prevent mold and dirt from contaminating solution; alcohol, if used, will evaporate

B. Ink fountain - ink should be dipped out of the ink fountain and discarded

C. Printing unit - plate should be gummed, blanket washed with solvent, impression cylinder cleaned and bearers wiped clean

D. Ink rollers - ink rollers should be cleaned each night to prevent drying and accumulation of dirt

   1. Matte - wash-up mattes replace the plate; solvent applied to rollers and dropped onto the matte which absorbs solvent and ink; repeated until clean; ends of rollers should be wiped dry

   2. Tray - tray is placed at back of roller train to squeeze solvent into tray; process is repeated until rollers are clean; ends of rollers should be wiped dry

IV. Adjustments

A. Night latch - latch on duplicators to disengage rollers in the ink train and prevent flat spots

B. Safety switches - safety switches should be in locked position when cleaning is finished

V. Procedure for Press Operation

A. Steps of press operation

1. Observe all safety rules.
2. Select all necessary materials - paper, ink, etc.
3. Lower paper platform.
4. Make adjustments.
    a. Adjust side guides.
    b. Position stock.
    c. Position separator (front) guides.
    d. Position air blowers.
    e. Set double sheet detector.
    f. Adjust and position suction feet.
    g. Raise stock.
    h. Set rear paper stop.
    i. Check paper height adjustment.
5. Adjust feed table.
    a. Turn on air system.
    b. Turn press by hand.
    c. Move paper feed control.
    d. Pick up sheet.
    e. Set jogger side guides.
    f. Set hardware.
    g. Move paper stop if necessary.
    h. Continue turning press by hand until stock reaches delivery system.
6. Adjust delivery system (chain delivery).
    a. Raise platform to proper height.
    b. Adjust side guides.

    c. Adjust back guides.

7. Adjust delivery system (chute delivery).
    a. Set side guides.
    b. Set rear stop.
    c. Position sheet retainer.

8. Prepare dampening system.
    a. Check fountain and fountain roller. They should be clean.
    b. Mix fountain solution.
    c. Measure pH.
    d. Place solution in fountain bottle.
    e. Place bottle in fountain holder. Make sure fountain solution does not come in contact with ink rollers.
    f. Place rollers in position.
    g. Turn over press by hand.
    h. Start press.
    i. Run press until rollers are dampened.

9. Inking system.
    a. Check ink fountain.
    b. Check rollers. They must be free of dirt.
    c. Place ink in fountain. Amount is determined by type of job.
    d. Set ink control knob.
    e. Set keys for thin ink film.
    f. Start press.
    g. Use manual control until rollers are properly inked. (More ink can easily be added but it is difficult to remove ink without cleaning the press.)

10. Prepare printing unit.

    a. Check blanket on press.

    b. Place plate on plate cylinder.

    c. Moisten with fountain solution using cotton pad.

    d. Start press.

    e. Lower dampener roller on to plate.

    f. Run for at least 20 revolutions. (Check for proper dampening of plate.)

    g. Lower ink rollers to image carrier.

    h. Start air and vacuum motor.

    i. Run three sheets through press.

    j. Check image position on center sheet.

    k. Make necessary adjustments, vertically as well as horizontally.

    l. When quality is reached, set counter.

    m. Run number of copies required.

    n. Raise ink and dampener rollers.

    o. Stop press.

11. Clean the press.

    a. Remove plate.

    b. Gum plate for a later run.

    c. Clean dampener system.

    d. Remove excess ink from fountain.

    e. Remove or lower fountain.

    f. Clean ink roller system.

    g. Clean fountain.

    h. Clean impression, blanket and plate cylinders with a rag, using blanket and roller solvent.

        i. Wipe down press.

        j. Turn off power.

    B. Points to remember when operating a press

        1. Only qualified and authorized persons should operate the press.

        2. Observe all safety rules when operating the press.

        3. Make sure the press is thoroughly cleaned after running a job.

        4. Check the press before turning it over by hand to make sure everything is in working order.

        5. Fountain solution should be on the plate; blanket solvent should be on the blanket.

        6. Only one person should run the press at any time.

        7. Adjustments on the press are critical.

VI. Summary and Conclusion

    A. Press areas

    B. Make-ready

    C. Press clean-up

    D. Adjustments

    E. Procedure for press operation

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

INTERACTION ITEMS:

1. Why turn the press through the cycle by hand first?
2. Why does the operator check the center sheet for position?
3. Compare the duplicator to a larger press.
4. What is the difference between position and registration?
5. At what speed should the press be operated?
6. What does the term "process color" mean?
7. Why is registration important in process work?
8. What are the process colors?
9. In what sequence should they be run?
10. If there are 4 process colors, why are there 5- and 6-unit presses?
11. Why is process work expensive?
12. What is the difference between 4-color printing and process printing?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Remove 15 consecutive sheets from the delivery system and feed them through the press again to check for registration.
2. Inspect the plate after stopping the press to see how fast the fountain solution evaporates. Use a cotton pad to wet the plate prior to starting the press each time.
3. Observe the quality control on process work on the next field trip. In what order was the color printed?
4. Refer to Adams and Faux, Printing Technology, page 325 for theory on color sequence. Discuss why.

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

EVALUATION ITEMS:

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 1. Fewer press problems occur when dampening rollers are too wet rather than too dry.

____ 2. Ink/water balance is critical to proper offset operation.

____ 3. Solution should be drained from the fountain at the end of each week.

____ 4. The proper margin can be obtained by adjusting the feeder and feed table.

____ 5. Safety switches should be in locked position when cleaning is finished.

____ 6. It is not necessary to check registration during the press run if it was set properly in the first place.

____ 7. Adjustment in the gripper margin is made by changing the placement of the plate and blanket cylinders.

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

EVALUATION ITEMS: NAME OF STUDENT: ____________________

PRESS OPERATION

EQUIPMENT:

1. Offset press with chain delivery

DID THE STUDENT:	YES	NO
1. Observe all safety rules.		
2. Select all necessary materials - paper, ink, etc.		
3. Lower paper platform.		
4. Make adjustments. a. Adjust side guides.		
b. Position stock.		
c. Position separator (front) guides.		
d. Position air blowers.		
e. Set double sheet detector.		
f. Adjust and position suction feet.		
g. Raise stock.		
h. Set rear paper stop.		
i. Check paper height adjustment.		
5. Adjust feed table. a. Turn on air system.		
b. Turn press by hand.		
c. Move paper feed control.		

		YES	NO
	d. Pick up sheet.		
	e. Set jogger side guides.		
	f. Set hardware.		
	g. Move paper stop if necessary.		
	h. Continue turning press by hand until stock reaches delivery system.		
6.	Adjust delivery system (chain delivery). a. Raise platform to proper height.		
	b. Adjust side guides.		
	c. Adjust back guides.		
7.	Adjust delivery system (chute delivery). a. Set side guides.		
	b. Set rear stop.		
	c. Position sheet retainer.		
8.	Prepare dampening system. a. Check fountain and fountain roller. They should be clean.		
	b. Mix fountain solution.		
	c. Measure pH.		
	d. Place solution in fountain bottle.		
	e. Place bottle in fountain holder. Make sure fountain solution does not come in contact with ink rollers.		
	f. Place rollers in position.		
	g. Turn over press by hand.		
	h. Start press.		
	i. Run press until rollers are dampened.		

	YES	NO
9. Inking system. a. Check ink fountain		
b. Check rollers. They must be free of dirt.		
c. Place ink in fountain. Amount is determined by type of job.		
d. Set ink control knob.		
e. Set keys for thin ink film.		
f. Start press.		
g. Use manual control until rollers are properly inked. (More ink can easily be added but it is difficult to remove ink without cleaning the press.)		
10. Prepare printing unit. a. Check blanket on press.		
b. Place plate on plate cylinder.		
c. Moisten with fountain solution using cotton pad.		
d. Start press.		
e. Lower dampener roller on to plate.		
f. Run for at least 20 revolutions. (Check for proper dampening of plate.)		
g. Lower ink rollers to image carrier.		
h. Start air and vacuum motor.		
i. Run three sheets through press.		
j. Check image position on center sheet.		
k. Make necessary adjustments, vertically as well as horizontally.		
l. When quality is reached, set counter.		
m. Run number of copies required.		

	YES	NO
n. Raise ink and dampener rollers.		
o. Stop press.		
11. Clean the press. a. Remove plate.		
b. Gum plate for a later run.		
c. Clean dampener system.		
d. Remove excess ink from fountain.		
e. Remove or lower fountain.		
f. Clean ink roller system.		
g. Clean fountain.		
h. Clean impression, blanket and plate cylinders with a rag, using blanket and roller solvent.		
i. Wipe down press.		
j. Turn off power.		

The student has satisfactorily completed the procedure "PRESS OPERATION" according to the steps outlined.

____

Instructor's Signature
(Verifying Satisfactory Completion)

____

Date

LESSON PLAN: 8

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

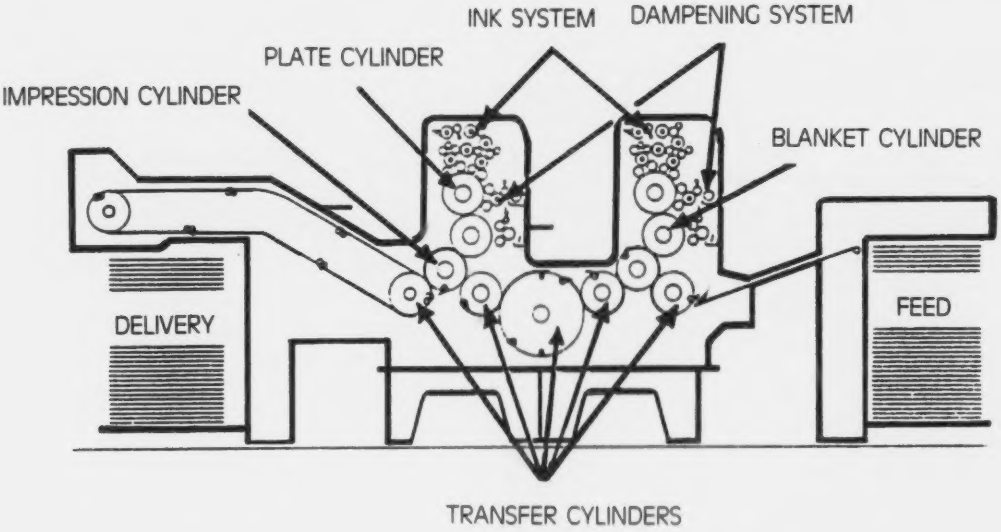
UNIT XI : OFFSET PRESS

ANSWERS TO EVALUATION ITEMS:

1. F
2. T
3. F
4. T
5. T
6. F
7. T

HO 1

The Offset Press


INK SYSTEM
DAMPENING SYSTEM
PLATE CYLINDER
IMPRESSION CYLINDER
BLANKET CYLINDER
DELIVERY
FEED
TRANSFER CYLINDERS

LESSON PLAN: 9

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

SCOPE OF UNIT:

The basic operation of the offset press has not changed since the beginning of the lithographic process. Presses have become faster and better but the principle remains the same. This unit covers the operation and safety of a duplicator; however, the terminology remains the same for a large sheet-fed or large web press.

INFORMATION TOPIC: XI-9 AND DEMONSTRATION: XI-9

PUTTING PLATE ON THE PRESS
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. List the four types of plate clamps.
2. Identify the function of locking, tension, and lateral adjustment screws.
3. List three reasons for adjusting plate packing.
4. Put a plate on the press according to the steps of procedure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. TM 1: Inserting the Plate into Clamp
2. TM 2: Plate Clamps
3. TM 3: Cam-Type Lock-Up
4. Plate
5. Plate Cylinder

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, unit 108, pp. 334-335.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch. 16, pp. 375-377.

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, chs. 12, 13, pp. 290-338.

REFERENCES:

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 6, pp. 134-135.

Cogoli, John E. Photo-Offset Fundamentals. Bloomington, IL: McKnight Publishing Company, 1980.

Porter, A. S. Lithographic Presswork. Pittsburgh, PA: Graphic Arts Technical Foundation, 1982.

Operator's Manual for the press

INTRODUCTION:

Putting the plate on the press may be the first operation done by the press operator, or it may be done after the feeder, delivery, dampening, and inking systems are all operable. Correctly placing the plate on the plate cylinder is vitally important to efficient operation of the press. A plate that is not put on straight will create problems with make-ready and positioning and possibly with feeding the sheets of paper. A plate that is not put on tight enough will slip out of registration and probably come off the press during operation.

LESSON PLAN: 9

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

OUTLINE: (Key Points)

I. Types of Plate Clamps (TM 1)

   A. Pin bar - a series of small holes across top and bottom of the plate that fit over pins on the plate cylinder; usually used on duplicators

   B. Slotted - a series of vertical slots across the top and bottom of the plate that fit into hooks in the plate cylinder; primarily used on duplicators

   C. Punched - special dies used to punch plates to fit perfectly on plate clamps on larger presses; these special punches allow for very little play in the plate and faster, more accurate make-ready

   D. Straight - a straight-edge plate that is locked into the plate clamp and held by locking screws

II. Plate Clamps (TM 2, TM 3)

   A. Locking screws - screws in the clamp that tighten against the plate to hold it firmly

   B. Tension screws - screws in the clamp that tighten against the plate to take the slack out of the plate

   C. Lateral adjustment - adjusting screws on the side of the plate clamp that allows the plate to be pushed to one side or the other, or to cock the plate

III. Plate Packing Adjustments

   A. Longer sheet image - remove packing from the plate cylinder and add to the blanket cylinder; allows image on the sheet to be longer; necessary when working with color work or poor conditions

   B. Shorter sheet image - remove packing from the blanket cylinder and add to the plate to make the image shorter

   C. Reasons for adjustments - paper stretch; too much pressure; tacky ink; moisture; resiliency of paper

IV. Procedure for Putting Plate on the Press

NOTE: Consult the press manual for the specifics of your press.

A. Release all adjusting screws on plate cylinder.

B. Place head of plate squarely in top clamp.

C. Lock clamp screws.

D. Insert packing between plate and cylinder.

E. Block off ink system.

F. Place press impression "on."

G. Roll press by hand until tail of plate can be placed in clamp.

H. Lock tail clamp screws.

I. Tighten plate tension screws to eliminate play in plate.

J. Tighten plate tension screws at top and bottom of plate.

V. Summary and Conclusion

A. Types of plate clamps

B. Plate clamps

C. Plate packing adjustments

D. Procedure for putting plate on the press

LESSON PLAN: 9

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

INTERACTION ITEMS:

1. Why is the plate cylinder usually on top of the configuration?
2. What is the purpose of the bearers?
3. Duplicators do not have bearers. What replaces them?
4. How can a press operator compensate for a plate that is not square?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Overpack the plate and observe the problem on the blanket.
2. Take packing from behind the plate and place behind blanket; note result of printed product.
3. Notice that the direction of the plate cylinder protects the plate should it become loose.

LESSON PLAN: 9

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

EVALUATION ITEMS:

1. List the four types of plate clamps:

   a.

   b.

   c.

   d.

2. Identify the function of:

   a. Locking screws:

   b. Tension screws:

   c. Lateral adjustment screws:

3. List three reasons for adjusting plate packing:

   a.

   b.

   c.

LESSON PLAN: 9

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

EVALUATION ITEMS: NAME OF STUDENT: ____________________

PUTTING PLATE ON THE PRESS

EQUIPMENT:

1. Plate
2. Plate cylinder

DID THE STUDENT:	YES	NO
1. Consult press manual.		
2. Release all adjusting screws on plate cylinder.		
3. Place head of plate squarely in top clamp.		
4. Lock clamp screws.		
5. Insert packing between plate and cylinder.		
6. Block off ink system.		
7. Place press impression "on."		
8. Roll press by hand until tail of plate can be placed in clamp.		
9. Lock tail clamp screws.		
10. Tighten plate tension screws to eliminate play in plate.		
11. Tighten plate tension screws at top and bottom of plate.		

The student has satisfactorily completed the procedure "PUTTING PLATE ON THE PRESS" according to the steps outlined.

____

Instructor's Signature
(Verifying Satisfactory Completion)

____

Date

LESSON PLAN: 9

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

ANSWERS TO EVALUATION ITEMS:

1. a. Pin bar
   b. Slotted
   c. Punched
   d. Straight
2. a. Hold the clamp that tightens against the plate to hold it firmly
   b. Hold the clamp that tightens against the plate to take slack out of the plate
   c. Hold the clamp that allows the plate to be pushed to one side or the other or to cock the plate
3. The student may list any three of the following:
   a. Paper stretch
   b. Too much pressure
   c. Tacky ink
   d. Moisture
   e. Resiliency of paper

Inserting the Plate into Clamp

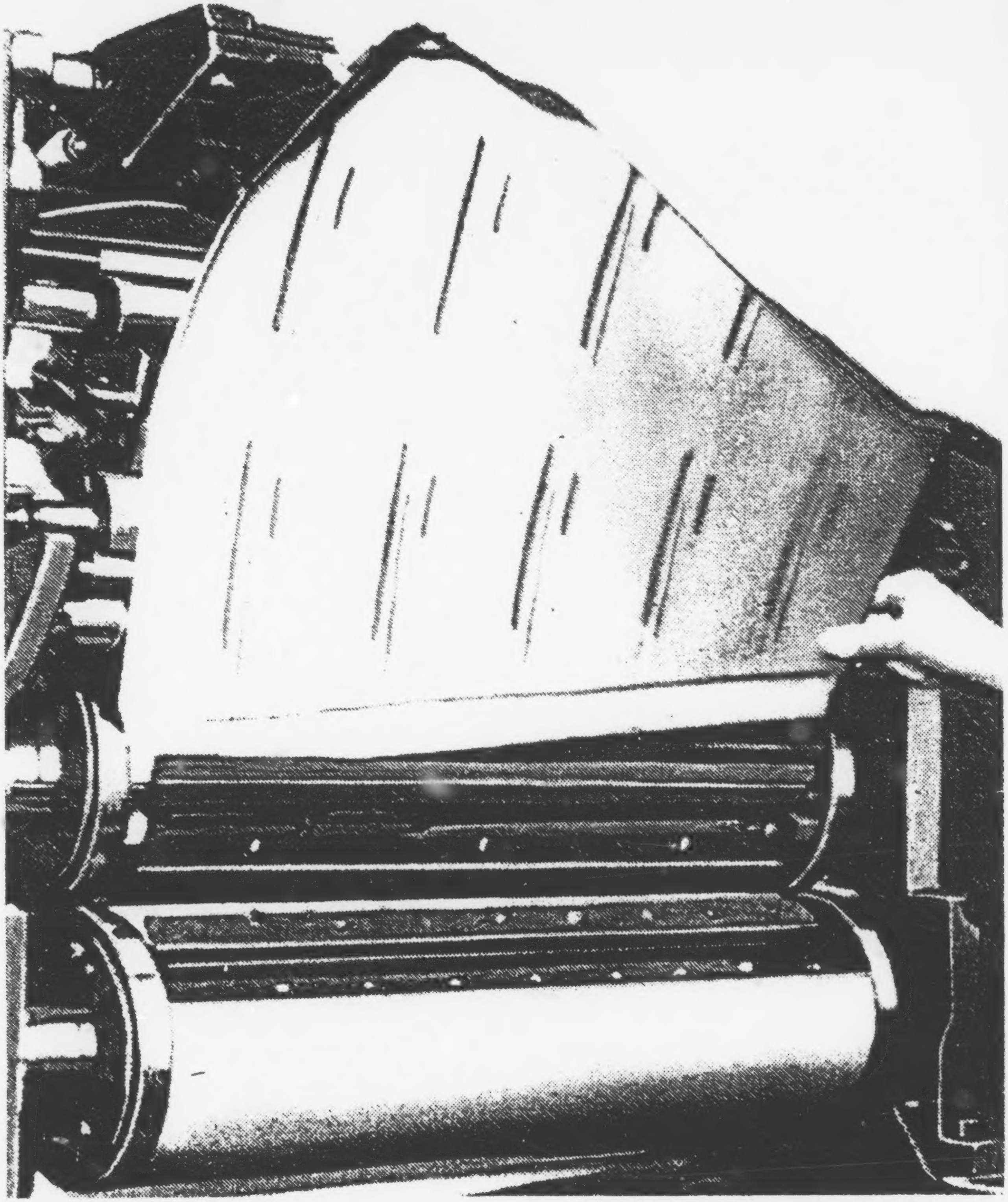
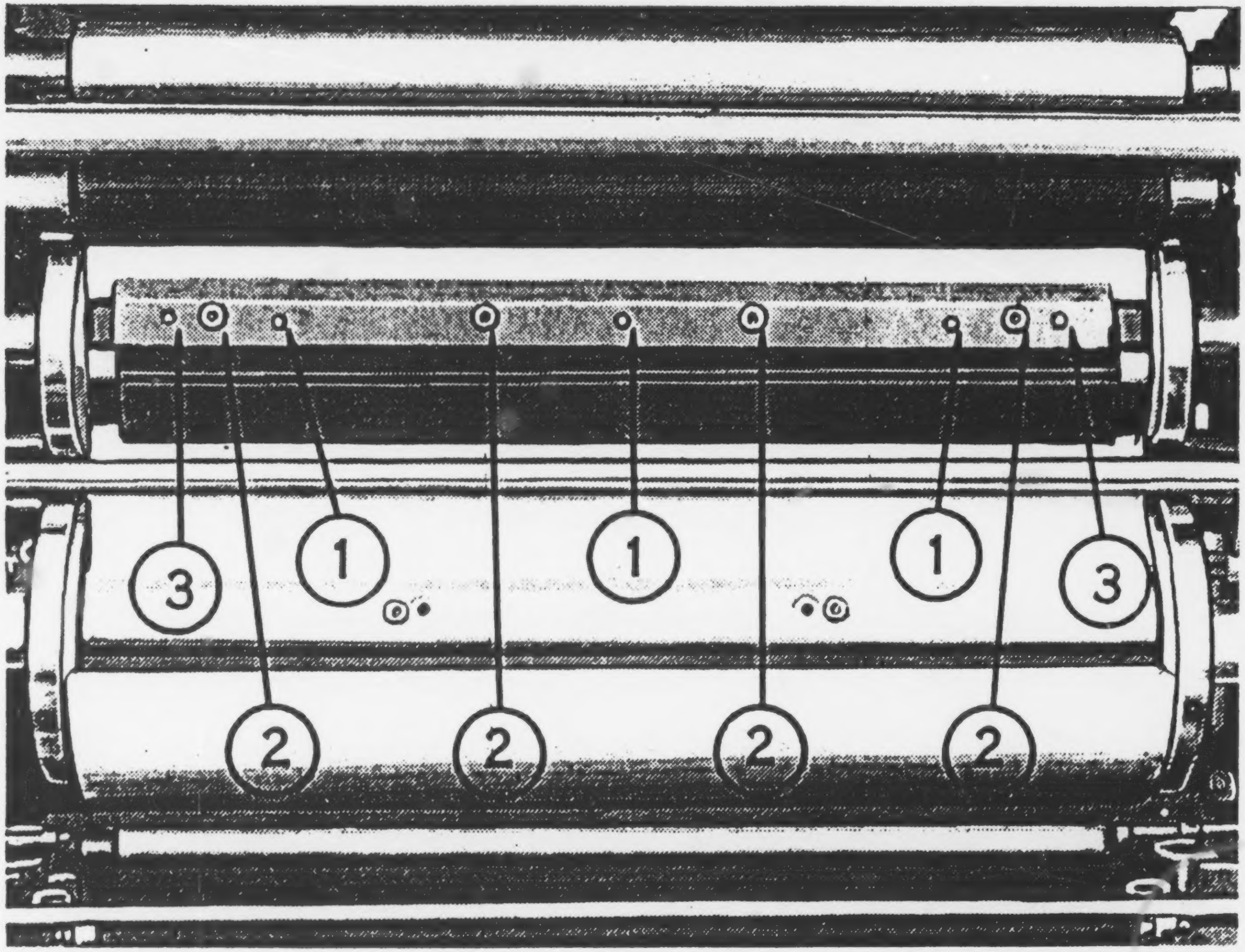
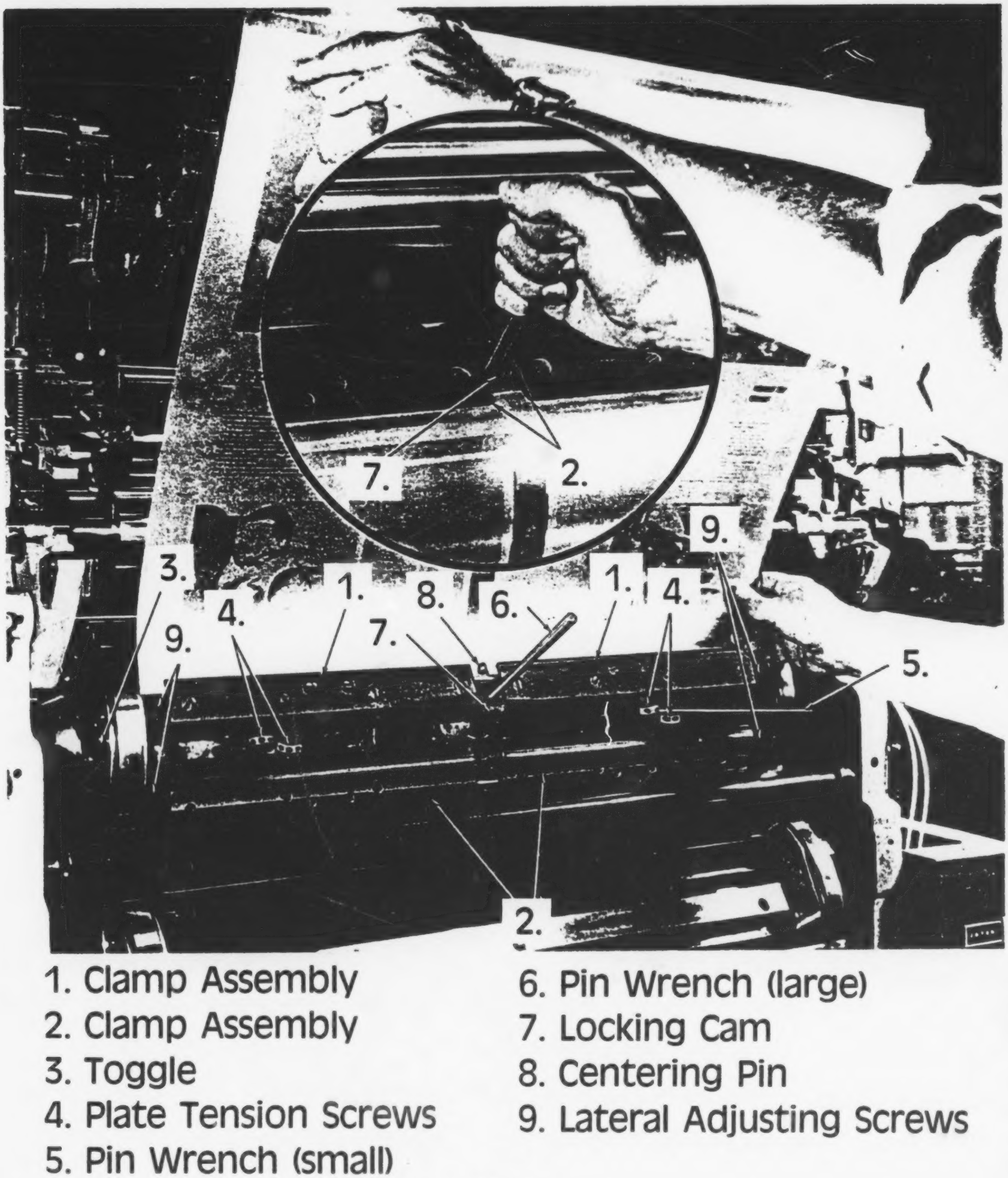


Plate Clamps



1. Tension Screws 2. Clamp Screws 3. Lateral Adjusting Screws

Cam-Type Lock-Up



1. Clamp Assembly
2. Clamp Assembly
3. Toggle
4. Plate Tension Screws
5. Pin Wrench (small)
6. Pin Wrench (large)
7. Locking Cam
8. Centering Pin
9. Lateral Adjusting Screws

LESSON PLAN: 10

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

SCOPE OF UNIT:

The basic operation of the offset press has not changed since the beginning of the lithographic process. Presses have become faster and better but the principle remains the same. This unit covers the operation and safety of a duplicator; however, the terminology remains the same for a large sheet-fed or large web press.

INFORMATION TOPIC: XI-10 OR DEMONSTRATION:

PRESS MAINTENANCE
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify true statements relating to regular maintenance of the press.
2. Match press instruments to their correct descriptions.
3. Match press problems to the specific press areas from which they originate.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Preventive Maintenance Checklist
2. HO 2: Suggested Preventive Maintenance Chart
3. HO 3: Press Problems
4. HO 4: Ink/Water Balance
5. HO 5: Setting Rollers

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 13, pp. 319-346.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, chs. 15, 16, pp. 341-422.

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Porter, A. S. Lithographic Presswork. Pittsburgh, PA: Graphic Arts Technical Foundation, 1982.

"Ink Troubleshooting Tips." American Printer. February 1982, pp. 40-44.

INTRODUCTION:

The old adage that "experience is the best teacher" certainly applies when operating the press. Experience from just operating the press and experience from others who have encountered similar problems gives insight and cures to problems that the press operator will need. Preventive maintenance cannot be overemphasized. Schedule certain parts of the press for regular cleaning and checking. Keep records of when maintenance was performed and condition of the part(s). Keep a record of press problems as they occur and the steps taken to remedy the problem. Refer to the record when the problem occurs again.

LESSON PLAN: 10

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

OUTLINE: (Key Points)

I. Regular Maintenance

   A. Scheduled lubrication - lubrication of the press should be performed according to a schedule, not when time is available

      1. Oiling - oiling should be done with the weight of oil recommended by the manufacturer; oil holes are often painted to show the operator where to find them; wipe off excess oil with a rag

      2. Grease - grease cups should be filled and other grease nipples filled on a scheduled plan; use a rag to wipe off excess grease

   B. Adjustments - adjustments should be checked during the scheduled maintenance time; check operator's manual for proper setting

   C. Preventive maintenance - preventive maintenance during the daily clean-up of the press can eliminate press problems during operation (HO 1, HO 2)

   D. Operation - adjustments may be necessary during the operation of the press run; this is especially true of the ink/water balance; feeder and delivery adjustments may need to be made also

II. Work Station

   A. Materials - materials necessary for the daily operation of a press should include:

      1. Cotton pads

      2. Rags

      3. Water

      4. Blanket solvent

      5. Gum arabic

      6. First aid supplies

7. Inspection table should be located close by

B. Instruments

1. Durometer - an instrument used to determine the hardness of rollers and blankets

2. Micrometer - an instrument used to measure the thickness of the plate, paper, and packing sheets

3. Packing gauge - a gauge used to measure the amount of packing necessary to bring the cylinder to the proper height

4. Densitometer - an instrument used to measure the density of ink on the printed sheet

5. pH testers - any of a variety of methods to measure the acidity of water, paper and fountain solution

6. Hydrometer - an instrument used to measure density of a liquid; used in the pressroom when mixing fountain solution

7. Graduates - used to measure the amount of liquids used in the pressroom, primarily fountain solution

8. Sword hygrometer - an instrument inserted into a stack of paper to determine the relative humidity of paper; relative humidity of paper affects static and drying time of ink

9. Hickey picker - a roller or instrument used to help remove hickies from the ink system

10. Magnifiers - used in the pressroom to inspect registration, halftones, plates and ink

11. Sling psychrometer - an instrument used to measure the relative humidity of the pressroom

12. Blanket thickness gauge - an instrument with a long neck to measure the thickness of an offset blanket

13. Snakeslip - a stick used to delete copy, marks, or scratches from an offset plate

14. Balance - a graduate scale used when mixing ink

15. Feeder gauges - gauges of varying thousandths in thickness, used for precise settings on the offset press

C. Blanket fix - a liquid that swells the surface on the blanket to temporarily fix a low spot

D. Deletion fluid - a fluid that is used to delete larger amounts of copy

E. Plate cleaner - a chemical that aids in cleaning the plate prior to operation

F. Scratch remover - a chemical that aids in removing scratches that may appear on the plate

G. Delivery dollies - extra dollies should be stored near the press for use when more than a single lift of stock must be run

III. Problem Solving (HO 3)

A. Theory - many press problems can be solved by concentrating on the basic function of each operation; watch the press when it is running correctly to isolate problems when it is not

B. Feeder

1. Double sheet detector set correctly

2. Height of pile correct

3. Sucker, rollers and springs set evenly

4. Side guide push/pull the same amount for each sheet

5. Is sheet bouncing?

C. Dampening

1. pH correct

2. Dwell between fountain and ductor roller set properly

3. Rollers parallel and set correctly

4. Roller covers clean

5. Too little/too much fountain solution

    6. Fountain too low

D. Inking (HO 4)

    1. Too much ink emulsifying
    2. Rollers set correctly
    3. Rollers parallel
    4. Ink fountain keys adjusted properly
    5. Proper ink for the paper
    6. Blanket in good shape
    7. Ink clean
    8. Too little/too much ink

E. Printing units (HO 5)

    1. Plate/blanket packing set correctly
    2. Impression pressure correct
    3. Plate/blanket tight
    4. Packing not creeping
    5. Grippers set correctly; transfer without tearing sheet

F. Delivery

    1. Stock curling at the tail
    2. Set-off problems
    3. Tracking rollers marking sheet
    4. Jogger set correctly

IV. Summary and Conclusion

A. Regular maintenance

B. Work Station

C. Problem solving

LESSON PLAN: 10

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

INTERACTION ITEMS:

1. How can a clean work station increase productivity?
2. How do good work habits produce good work?
3. Why does the operator lubricate the press after cleaning?
4. Why does the operator wipe excess grease and oil off the press?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Build a tool panel for each press to contain equipment for that press.
2. Check safety equipment in the immediate press area.
3. Set up a schedule for preventive maintenance.
4. Unplug equipment and remove guards; check belts, chains and cords for wear.
5. Prioritize the press room instruments as to their need in your pressroom.

LESSON PLAN: 10

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

EVALUATION ITEMS:

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 1. The press should be lubricated whenever time is available, but only when the workload has slackened.

____ 2. Preventive maintenance during the daily clean-up of the press can eliminate problems during operation.

____ 3. Adjustments should never be made during operation of the press run.

Match the following instruments to their correct descriptions:

____ 4. Densitometer

____ 5. Snakeslip

____ 6. Hydrometer

____ 7. Micrometer

____ 8. Sling psychrometer

____ 9. Durometer

____10. Balance

a. An instrument used to measure density of a liquid; used in the pressroom when mixing fountain solution

b. An instrument used to measure the relative humidity of the pressroom

c. An instrument used to measure density of ink on the printed sheet

d. An instrument used to determine the hardness of rollers and blankets

e. An instrument used to measure the thickness of the plate, paper, and packing sheets

f. A pumice stick used to delete copy, marks, or scratches from an offset plate

g. A graduate scale used when mixing ink

Match the problem on the left with the press area on the right.

_____11. Blank sheets appear among printed sheets

_____12. Paper feeds straight; image is crooked

_____13. Gray copy

_____14. Copy too dark

_____15. Ghosting

_____16. Ink emulsifying

_____17. Double image on sheet

_____18. Scumming

_____19. Poor registration

_____20. Certain copy area printing very light

_____21. Sheet torn at gripper edge

_____22. Sheet curl at delivery

_____23. Hickies

_____24. Set-off

_____25. Paper missing grippers

a. Feeder

b. Dampening

c. Ink

d. Printing units

e. Delivery

LESSON PLAN: 10

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XI : OFFSET PRESS

ANSWERS TO EVALUATION ITEMS:

1. F
2. T
3. F
4. c
5. f
6. a
7. e
8. b
9. d
10. g
11. a
12. d
13. b
14. c
15. c
16. b
17. d
18. b
19. a
20. d
21. e
22. b
23. c
24. c
25. a

HO 1

Preventive Maintenance Checklist

Preventive maintenance may be the most important aspect of daily press operation. Many problems can be eliminated by a quick check of each press operation during daily clean-up. Use this list as a guide when performing the preventive maintenance check and as a reference when making adjustments to each press operation.

FEEDER	YES	NO	COMMENTS
Air filters cleaned			
Vacuum pump/motor lubricated			
Feeder oiled			
DAMPENING			
Dampener covers clean			
Steel rollers cleaned and gummed			
Dampening rollers set properly			
Dampening system oiled			
INKING			
Ends of ink roller cleaned			
Ink rollers not showing signs of glazing			
Ink rollers set properly			
Ink fountain and adjusting keys clean and working			
Ink train oiled			
PRINTING UNIT			
Blanket inspected for low spots and glazing			
Bearers clean and oiled			
Impression cylinder clean			
Lubrication points behind guards oiled			
Plate and blanket packing in good condition			
Impression cylinder/blanket adjustment correct			
DELIVERY			
Tension of delivery grippers correct			
Tension of transfer grippers correct			
Ejector wheels roll freely			
Set-off spray system working			
Lubricate necessary points			
WORK STATION			
Dirty rags properly contained			
Chemicals properly stored			
First aid supplies adequate			
Tools in proper place			
No shortage of supplies/materials			

HO 2

Suggested Preventive Maintenance Chart

Preventive Maintenance Schedule

Equipment

Activity	Daily	Weekly/Bi-weekly	Monthly
CLEAN Date Performed M T W TH F	Clean ink, oil, lint, and dust from all exposed surfaces of press and work area	Clean total press including side frame surfaces, work area, and floor under press Date	Remove press side covers, clean oil, grease, lint, and dust from all surfaces; deglaze rollers and blanket Date
LUBRICATE Date Performed M T W TH F	Oil friction points of fast moving parts (List points)	Oil friction points of all exposed moving parts (List points) Date	Remove side covers; oil and/or grease all friction points (List points) Date
ADJUST Date Performed M T W TH F	Make adjustments as required for jobs being printed	Make adjustments as required to solve problems Date	Check and adjust as required all operator controllable settings; form roller parallel, form roller pressure, all cylinders parallel, all cylinders pressure Date

Operator's guide or manufacturer's guide(s) to use for determining proper lubrication and adjustments ______________________________

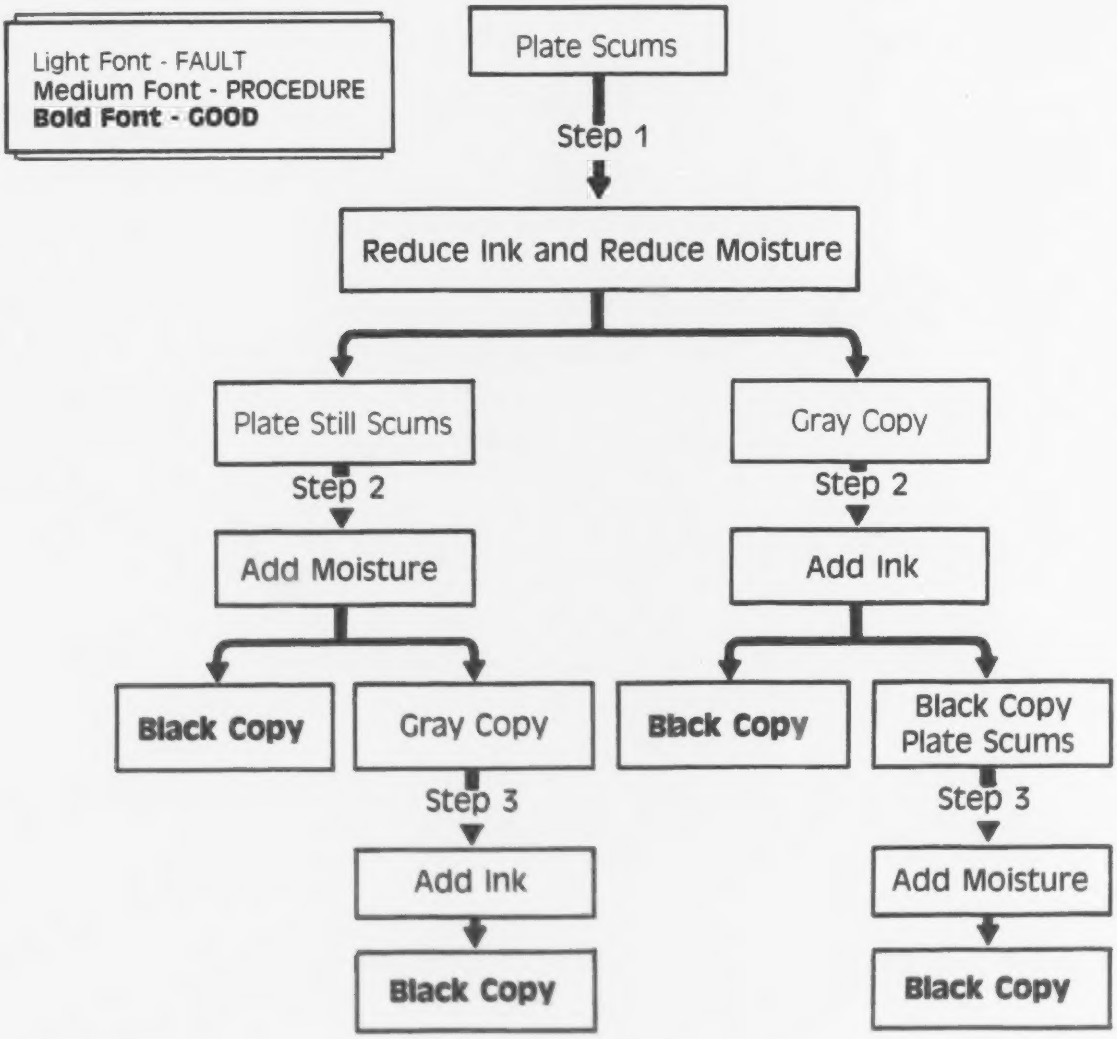
(Back Side of Chart)

Date	Problem	Solution

Ink/Water Balance

1. Adjust the flow of ink to the proper amount which may be defined as the least amount possible to provide the desired image coverage.

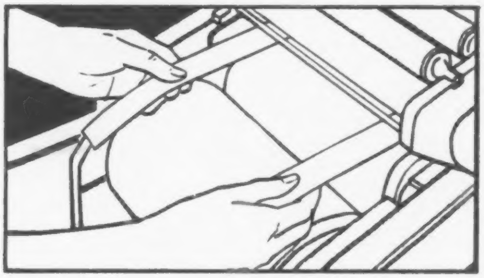
2. Adjust the amount of moisture to the proper amount, which is the least amount possible to keep the nonimage areas clean while doing this.


Light Font - FAULT
Medium Font - PROCEDURE
Bold Font - GOOD
Plate Scums
Step 1
Reduce Ink and Reduce Moisture
Plate Still Scums
Gray Copy
Step 2
Step 2
Add Moisture
Add Ink
Black Copy
Gray Copy
Black Copy
Black Copy Plate Scums
Step 3
Step 3
Add Ink
Add Moisture
Black Copy
Black Copy

HO 5

Setting Rollers

Dampener Form Roller-to-Plate Pressure
After mounting a plate, place two strips of paper between the form roller and the plate. With the form rollers in "on" position, you should feel a uniform, firm pull on the strips.



Ink Form Rollers-to-Plate Pressure
Determine the correct setting by an ink band check. Drop the ink form rollers gently to the plate cylinder and lift them. Turn the handwheel to bring the plate around for inspection. The ink band should be a parallel, uniform band of ink 1/8 inch wide.

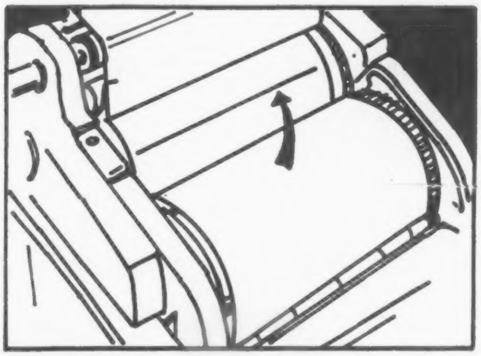
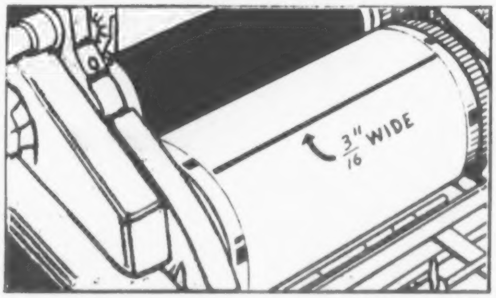


Plate Cylinder-to-Blanket Cylinder Pressure
For checking the ink form rollers-to-plate pressure, turn the machine on and ink up the plate completely. The entire plate must be covered. This means you do not drop the dampener rollers. Turn the duplicator off, then drop the plate cylinder to the blanket gently and raise it immediately.



Rotate the blanket cylinder by the handwheel and inspect the ink band. It should be a uniform, parallel band of ink 3/16 inches wide. If not, a pressure adjustment must be made.

This sequence is recommended for checking pressures:

1. Dampener form roller-to-plate
2. Ink form rollers-to-plate
3. Plate cylinder-to-blanket cylinder

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

SCOPE OF UNIT:

Most printing jobs require a post-press finishing operation. This operation may be simply cutting jobs apart for folding, such as a program or brochure. It may be, and very often is, more complicated involving several operations. Collating may be followed by a binding step. The whole bindery area is probably the most overlooked area of the printing industry and is very possibly the most monotonous, often employing semiskilled labor.

INFORMATION TOPIC: XII-1 AND DEMONSTRATION: XII-1

PAPER CUTTER SAFETY
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify types of paper cutters.
2. Identify parts of a paper cutter.
3. Identify safety considerations for working with a paper cutter.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Paper Cutter
2. Paper cutter
3. Paper

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, unit 154, pp. 471-475.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch. 23, pp. 578-485; pp. 607-611.

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 21, pp. 514-517.

REFERENCES:

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 16, pp. 280-283.

Cogoli, John E. Photo-Offset Fundamentals. Bloomington, IL: McKnight Publishing Company, 1980, ch. 15, pp. 277-278.

INTRODUCTION:

Proper instruction on the paper cutter, and only one cutter operator, makes the cutter one of the safest pieces of equipment in the plant. When two people work at the cutter, chances of an accident resulting in personal injury and/or an inaccurate cut are greatly increased. A second person overrides the machine's safety features and distracts the operator. A single cut at the wrong place and that lift of paper may be ruined.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

OUTLINE: (Key Points)

I. Types of Paper Cutters

  A. Guideline - the most popular type of commercial paper cutter; uses a guillotine action of the blade to cut a stack of paper

  B. Dip-shear - a commercial paper cutter type where the knife dips as it cuts the paper

II. Parts of a Paper Cutter (HO 1)

  A. Backgauge - an adjustable part against which paper is placed for cutting

  B. Backgauge wheel - the wheel adjustment to determine the depth of the backgauge and the cut

  C. Indicator - indicates to the operator the depth of the backgauge; usually in inches

  D. Clamp - pressure bar that lowers to the paper and holds it securely for the cutting process

  E. Clamp plate - steel bar on the bottom of the clamp that evenly distributes pressure of the clamp on the paper

  F. Cutting stick - strip of wood or plastic that the knife strikes after cutting through the paper

  G. Knife - the knife is a beveled razor-sharp steel blade that cuts the paper

  H. Index - an index of programmable cutting sequence on some paper cutters

  I. Foot pedal - pedal that manually brings the clamp to the paper without adding pressure

  J. Table - the flat smooth surface on which the paper rests while being cut

III. Manual Paper Cutters - paper cutters which require manual operation of any or all of the cutter operation: lever, clamp and backgauge

A. Lever - a lever used by operator to cut the paper with a guillotine operation

1. Table - a lever type paper cutter that sits on a table

2. Floor - a lever type paper cutter that sits on the floor

B. Semi-automatic - a floor type paper cutter that uses power to cut the paper, but the backgauge and clamp are done by hand; some models also include power clamps

IV. Automatic Paper Cutters - paper cutters that do the entire cutting operation automatically

A. Adjustable clamp pressure - clamp pressure can be adjusted to enable better quality of cut for thin, small, and spongy paper

B. Programmable - paper cutters that have programs (either pre-set or programmed by operator) to move backgauge from one setting to the next cut

C. Paper handling - air pressure that lessens the weight of the paper handling by the operator when working with large sheets; some models use roller bearings instead of air pressure

V. Cutter Safety

A. One-person operation - all modern paper cutters will not operate unless both hands are on the releases; two people at the cutter demonstrates poor judgement

B. Blade release - blade will not cut unless both releases are used

C. Cutting light - a bead of light which indicates the cutting point

D. Clamp pressures - clamp pressure is activated by blade release buttons to protect hands

E. Foot pedal - lowers clamp but does not have pressure

F. Clamp - clamp comes down before knife to hold sheets

G. Blade - blade releases will stop blade at any point during cycle if pressure is released from buttons

H. Blade clamp - clamps that screw into blade to safely handle blade when changing blade

VI. Procedure for Cutting Paper

A. Set backgauge and lock. Jog paper.

B. Position paper against backgauge and left side of cutter.

C. Lower clamp against paper with foot pedal.

D. Press knife controls, release when blade reaches cutting stick, clamp raises as blade recedes on most cutters.

E. Remove paper against backgauge and stack in uneven stock.

F. Make additional cuts as necessary.

G. All cuts may be made on a single lift if using a programmable cutter.

VII. Summary and Conclusion

A. Types of paper cutters

B. Parts of a paper cutter

C. Manual paper cutters

D. Automatic paper cutters

E. Cutter safety

F. Procedure for cutting paper

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

INTERACTION ITEMS:

1. What safety features are there on a cutter?
2. Why should only one person operate the cutter?
3. What is the advantage of a split backgauge?
4. What aids are there on a cutter to make it easier to handle the paper?
5. Does the cutting sequence change for a programmable cutter?
6. Why are there few size changes when operating a 3-knife trimmer?
7. What results when the cutting sequence is not followed?
8. Why should the clamp pressure be reduced before cutting carbonless paper?
9. When cutting printed stock, why is the press gripper margin important?
10. Why is the press side guide important?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Label the parts of the paper cutter that are important in the operation of the cutter, and have students learn these parts. Replace the labels with numbers and have them identify them.
2. Remove the clamp plate and observe problems of cutting small stock.
3. Cut carbonless stock with and without the clamp plate. Observe the difference. Reduce the clamp pressure and also observe the difference.
4. Using printed stock, make a cutting sequence. Keep track of the press gripper and side guide edge of the sheet.

5. Using the split backgauge, determine and set cutter to trim soft cover books. Discuss steps and material handling saved with the split backgauge.

6. Point out safety features of the paper cutter. Make sure all guards are in place and working.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

EVALUATION ITEMS:

1. Identify the following parts of the cutter.

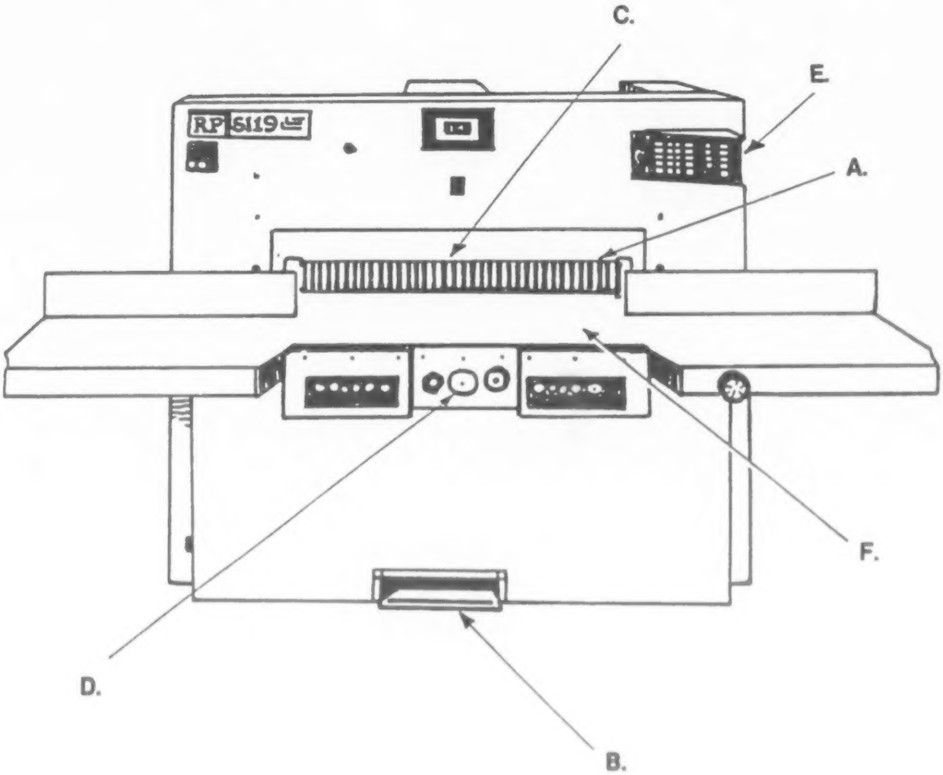
a. ____________________

b. ____________________

c. ____________________

d. ____________________

e. ____________________



For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 2. The safest way to operate a paper cutter is with two people.

____ 3. Jogged coated stock will slide more than uncoated stock.

____ 4. Cutting can be done with the clamp plate removed.

____ 5. The cutting stick can be turned for more use.

____ 6. The dip-shear is the most popular type of cutter.

7. List the two major types of paper cutters.

    a.

    b.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

EVALUATION ITEMS: NAME OF STUDENT:_______________

CUTTER PAPER

EQUIPMENT:

1. Paper cutter
2. Paper

DID THE STUDENT:	YES	NO
1. Set backgauge and lock. Jog paper.		
2. Position paper against backgauge and left side of cutter.		
3. Lower clamp against paper with foot pedal.		
4. Press knife controls, release when blade reaches cutting stick.		
5. Remove paper against backgauge and stack in uneven stock.		
6. Make additional cuts as necessary.		

The student has satisfactorily completed the procedure "CUTTING PAPER" according to the steps outlined.

____
Instructor's Signature
(Verifying Satisfactory Completion)

____
Date

LESSON PLAN: 1

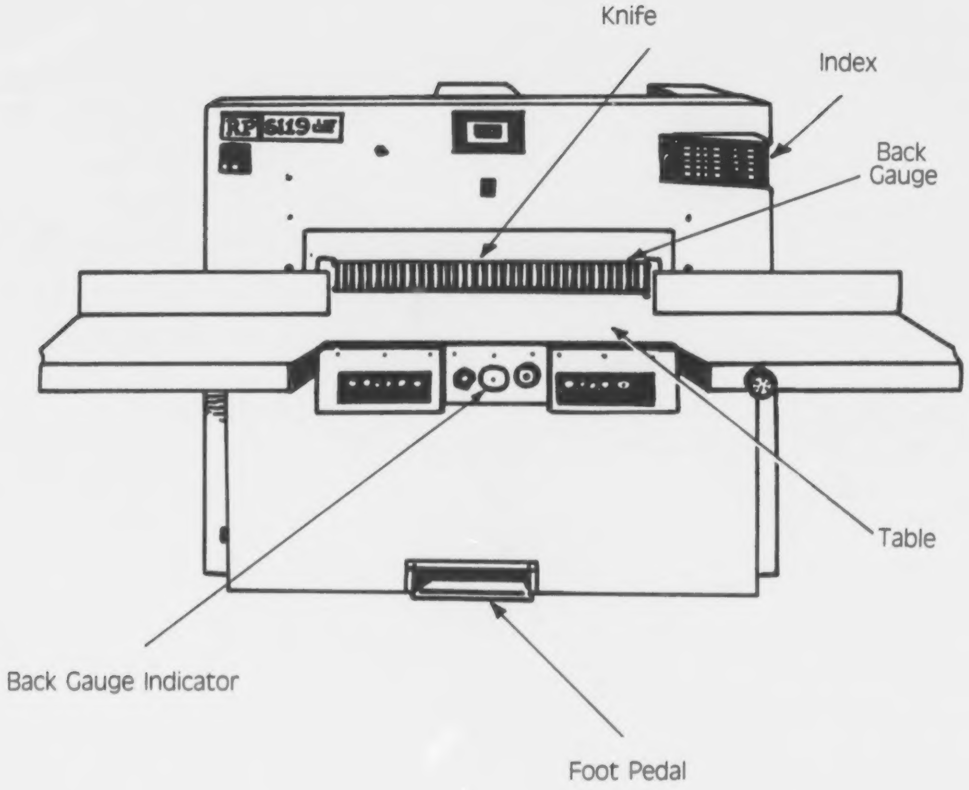
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

ANSWERS TO EVALUATION ITEMS:

1. a. Backgauge
   b. Foot pedal
   c. Knife
   d. Backgauge indicator
   e. Index
2. F
3. T
4. T
5. T
6. F
7. a. Guillotine
   b. Dip-shear

Paper Cutter


Knife
Index
Back Gauge
Table
Back Gauge Indicator
Foot Pedal

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

SCOPE OF UNIT:

Most printing jobs require a post-press finishing operation. This operation may be simply cutting jobs apart for folding, such as a program or brochure. It may be, and very often is, more complicated involving several operations. Collating may be followed by a binding step. The whole bindery area is probably the most overlooked area of the printing industry and is very possibly the most monotonous, often employing semiskilled labor.

INFORMATION TOPIC: XII-2 OR DEMONSTRATION:

PAPER CUTTING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify points in determining cutting sequence.
2. Identify steps in setting the paper cutter.
3. Make a cutting diagram and indicate settings for the paper cutter.
4. Indicate the sequence of cuts for cutting stock to specified dimensions.
5. Cut stock.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Determining Cutting Sequence
2. HO 2: Setting the Paper Cutter
3. HO 3: Three-Knife Trimmer
4. As 1: Cutting Paper

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, unit 154, pp. 471-475.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch. 23, pp. 578-485; pp. 607-611.

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 21, pp. 514-517.

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Cogoli, John E. Photo-Offset Fundamentals. Bloomington, IL: McKnight Publishing Company, 1980, ch. 15, pp. 277-278.

INTRODUCTION:

The skill of paper cutting is a precise science, whether the operator is cutting stock that will be printed or stock that has been printed. Any miscalculation or improper setting will ruin the job or paper stock. The skill and precision of the three-knife trimmer is more important because bindery operations have been added to the press work. Trimming must be accurate and straight.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

OUTLINE: (Key Points)

I. Sequence for Cutting Paper (HO 1)

  A. Unprinted paper - trim unprinted paper on all sides to insure paper is square

  B. Printed paper - initial cuts should be opposite the gripper edge of the paper and opposite the side guide

    1. Gripper edge - the edge of the paper that is picked up by the grippers of the press

    2. Side guide edge - the edge of the paper that is next to the side guide

  C. Programmed - when using the program to cut paper, the sequence should be from largest size to smallest; most paper cutters move only forward when programmed

II. Setting the Paper Cutter (HO 2)

  A. Determine sequence for cutting - draw or mark on top sheet the proper settings for the paper cutter

  B. Set backgauge - move backgauge past the desired setting and bring up to 1/4" of setting mechanically and then forward to the proper setting by hand; lock backgauge if possible

  C. Check index - after setting the backgauge, check the index to make sure the setting is correct

  D. Jog paper against backgauge - jog the paper against backgauge until all sheets are even

  E. Cut all paper - cut all paper at this setting before moving to next setting to ensure proper setting and uniform paper

  F. Lifts of paper - lifts of paper should be only the amount of paper that the operator can handle comfortably

III. Programmed Cutting

A. Determine sequence for cutting - mark measures on top sheet prior to setting cutter

B. Clear channel - clear the selected channel from the previous program

C. Set program - using top sheet as guide, set program according to instructions; begin the program at the longest cut

D. Cut paper - cut a single lift of paper all the way through the program before using the next lift

IV. Three-Knife Trimmers (HO 3)

A. Function - the function of three-knife trimmers is to trim three sides of a bound book at one time; an on-line operation designed to limit materials handling

B. Procedure - follow directions of system, as they vary with each trimmer system

V. Summary and Conclusion

A. Sequence for cutting paper

B. Setting the paper cutter

C. Programmed cutting

D. Three-knife trimmers

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

INTERACTION ITEMS:

1. How is the sequence for cutting printed paper different from cutting unprinted paper?
2. What is the proper method to set the paper cutter?
3. What is the three-knife trimmer and how is it used?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

EVALUATION ITEMS:

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 1. When cutting printed stock, the gripper edge is cut first.

____ 2. A ream of stock may be cut at one time.

____ 3. Unprinted stock is assumed to be square.

____ 4. The side opposite the side guide should be cut before the side guide edge.

____ 5. The backgauge should be set for the longest cut first.

____ 6. The index serves as a check with the backgauge.

____ 7. When using the program on a paper cutter, the same cut should be made for the entire stock.

____ 8. When using the program on a paper cutter, the sequence should be from longest to shortest cut.

____ 9. Multiple trimmers have only a single knife.

____10. Multiple trimmers cut three sides of a book at once.

LESSON PLAN: 2

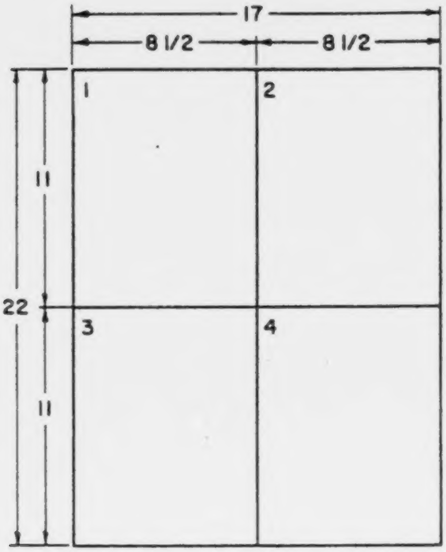
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

ANSWERS TO EVALUATION ITEMS:

1. F
2. T
3. F
4. T
5. T
6. T
7. F
8. T
9. F
10. T

Determining Cutting Sequence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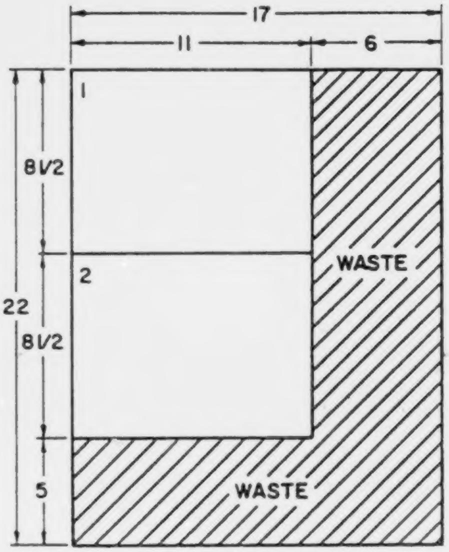
4

A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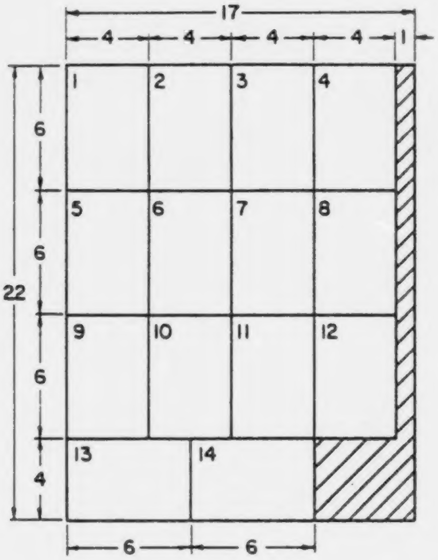
WASTE

B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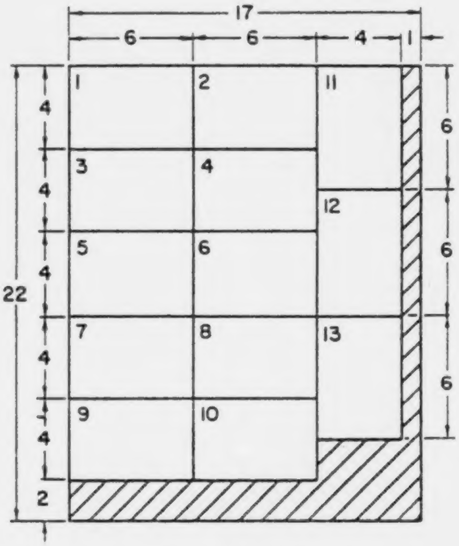
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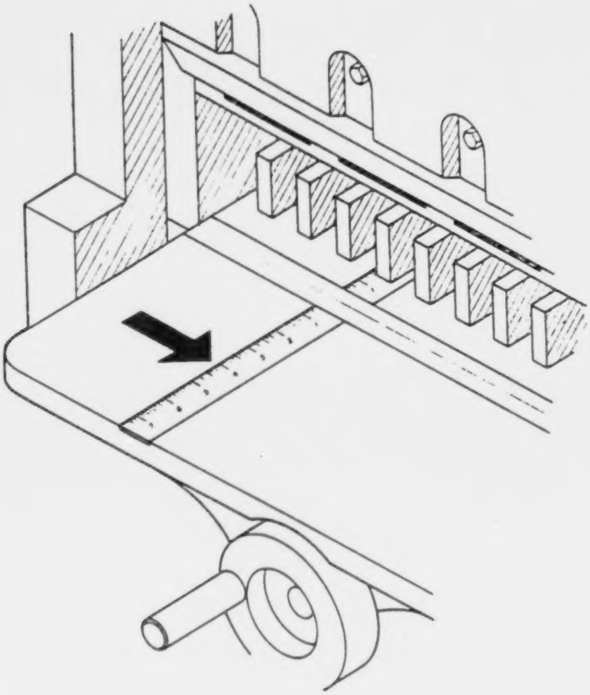
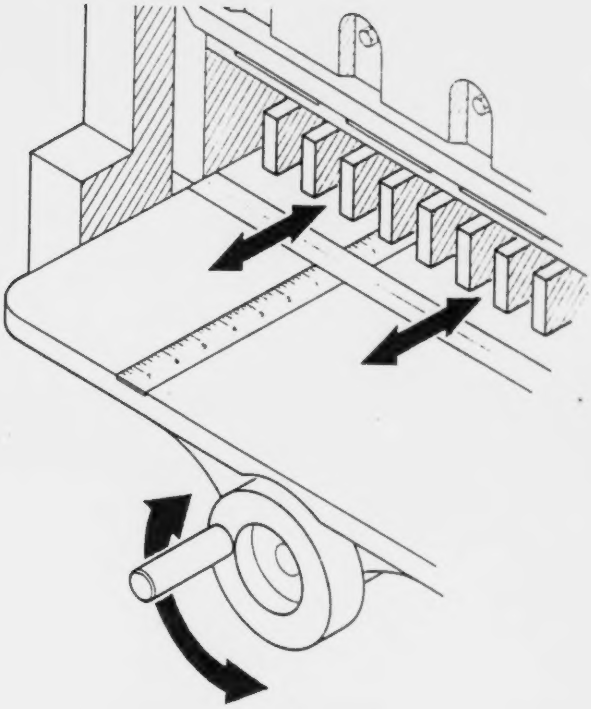
HO 2

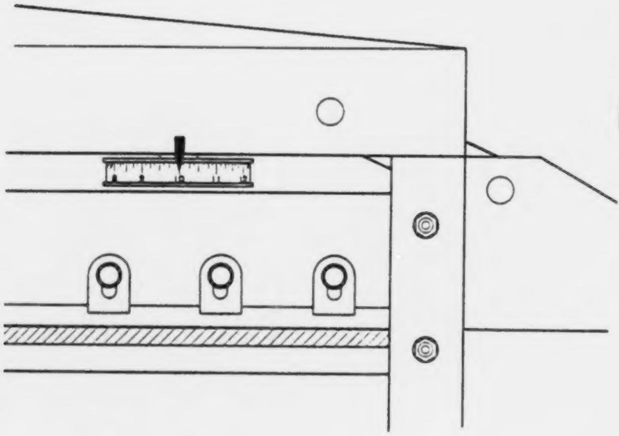
Setting the Paper Cutter



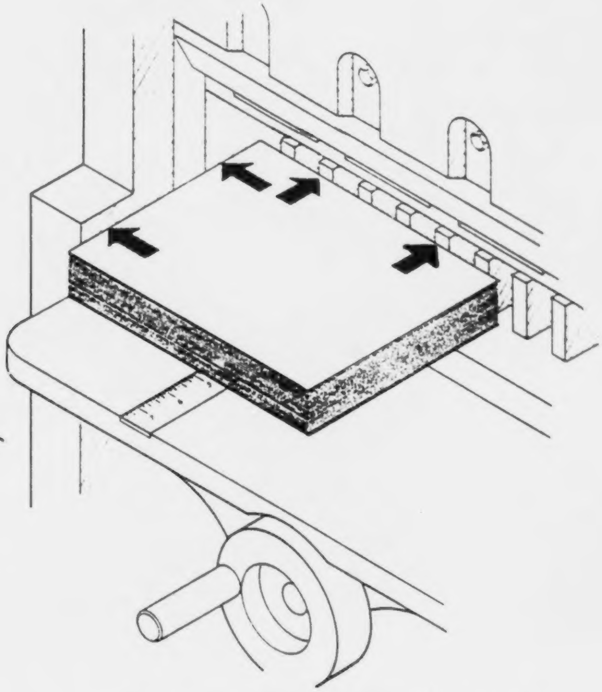
1. Engraved rule on paper cutter



2. Backgauge



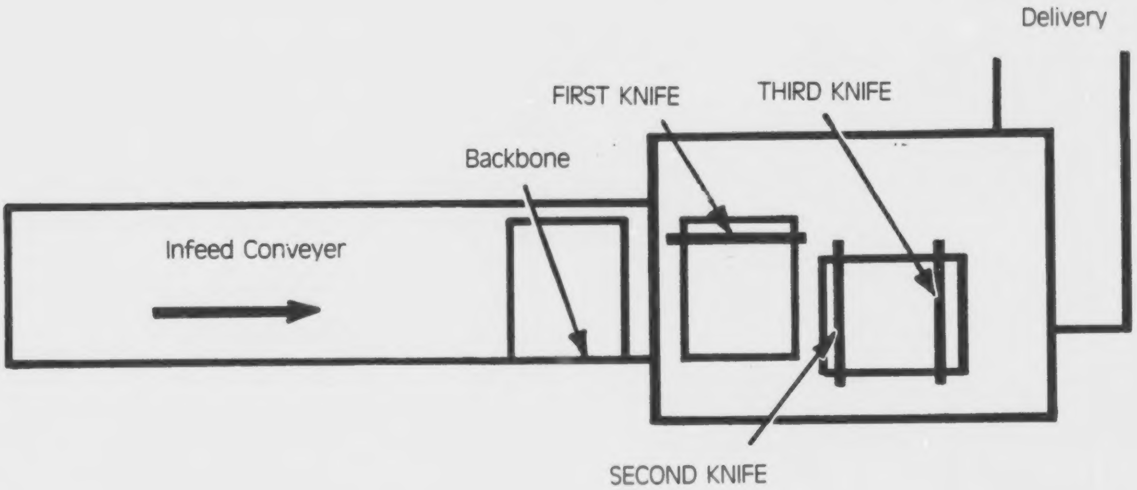
3. Paper cutter index



4. Jogged paper against backgauge and side

HO 3

Three-Knife Trimmer


Delivery
FIRST KNIFE
THIRD KNIFE
Backbone
Infeed Conveyer
SECOND KNIFE

ASSIGNMENT SHEET 1 - CUTTING PAPER

Directions: Complete the following exercises as directed.

1. Make a diagram to cut stock 5½" x 8½" from 17" x 22" stock. Indicate settings for the paper cutter.

2. Indicate sequence of cuts.

3. Cut the stock. (Note: Do not forget to backtrim stock.)

4. Make a cutting diagram for stock 5" x 7" to be cut from 17" x 22" stock.

5. Indicate sequence of cuts.

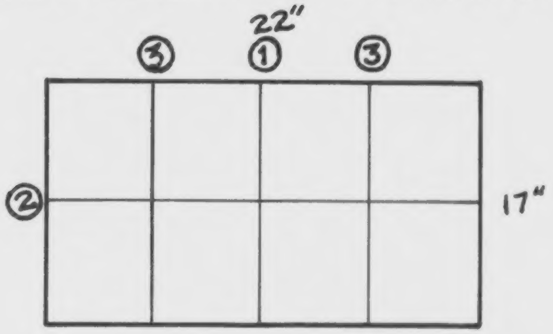
   1st Cut:

   2nd Cut:

6. Cut the stock. (Note: Do not forget to backtrim stock.)

ANSWERS TO ASSIGNMENT SHEET 1 - CUTTING PAPER

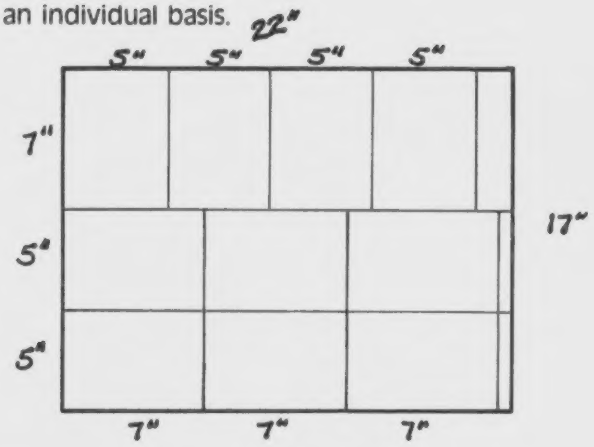
1. //



2. 1st Cut: 11"
   2nd Cut: 8½"
   3rd Cut: 5½"

3. Instructor evaluates on an individual basis.

4.


22"
5"
5"
5"
5"
7"
5"
5"
17"
7"
7"
7"

5. 1st Cut: 5"
   2nd Cut: 7"

6. Instructor evaluates on an individual basis.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

SCOPE OF UNIT:

Most printing jobs require a post-press finishing operation. This operation may be simply cutting jobs apart for folding, such as a program or brochure. It may be, and very often is, more complicated involving several operations. Collating may be followed by a binding step. The whole bindery area is probably the most overlooked area of the printing industry and is very possibly the most monotonous, often employing semiskilled labor.

INFORMATION TOPIC: XII-3 OR DEMONSTRATION:

FOLDING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify characteristics of various folders.
2. List four specialty operations performed on a folder.
3. Determine plates and settings for folding jobs.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Types of Folders
2. HO 2: Principle of a Buckle Folder
3. HO 3: Types of Feeders
4. AS 1: Determining Plates and Settings for Folding Jobs

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, unit 153, pp. 465-466.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch. 23, pp. 585-596.

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 21, pp. 517-519.

REFERENCES:

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 12, pp. 208-209.

Cogoli, John E. Photo-Offset Fundamentals. Bloomington, IL: McKnight Publishing Company, 1980, ch. 15, p. 283.

INTRODUCTION:

The buckle folder is the most popular folder used in the industry today. When large sheets are folded, a combination folder together with the knife folder are usually used to make the first fold. Folding, perforating, scoring and/or slitting and gluing can be done on the folder with great accuracy. Skill and accuracy are of the utmost importance when working with sheet-fed presses. Web presses, because of their speed, do not require or get that precision. Plastic rollers have replaced steel rollers on some folders and baffles have been added to meet OSHA requirements.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII: FINISHING OPERATIONS

OUTLINE: (Key Points)

I. Buckle Folder - the sheet meets a plate and buckle, going the other direction (HO 1, HO 2)

  A. Friction Feed - feed is by friction between one turning roller and one stationary roller; friction feeders are usually on table-top folders (HO 3)

  B. Suction feed - feed is by suction from a vacuum pump and is adjustable for various thicknesses of paper

  C. Continuous feed - form of suction feed; paper is wrapped above the feeder and can be continuously loaded (HO 3)

  D. Pile feeder - usually a suction feed that feeds a pile of stock and then must be stopped and reloaded

  E. Right angle fold - a folding operation where the folder changes the direction of the sheet 90 degrees for the next fold; used primarily in signatures and book folding

  F. Baffles - baffles are mufflers placed over the buckles of the folder to help quiet the operation of the folder

II. Knife Folder - the sheet is positioned below a knife which pushes the sheet between rollers to fold (HO 1)

III. Combination Folder - a combination of the buckle and knife folder

IV. Web Folder - folding operation on a web press

  A. Formers - plates of metal that curl the sheets as they enter the folder

  B. Angle bars - slanted bars that angle the sheet to the proper position prior to entering the formers

V. Specialty Folding Operations - operations that can be done on the buckle folder

A. Perforation - a roller attached to a buckle folder that puts perforations on the sheet to facilitate tearing and folding; this operation can be done in addition to folding

B. Slitting - a roller attached to a buckle folder that cuts the paper forming separate sheets; this operation can be done prior to folding and is designed to require less paper handling

C. Scoring - a roller attached to a buckle folder that places a crease in the sheet to allow for a better fold; often used with heavier stock for signatures that may require multiple folds

D. Gluing - a trough that allows a strip of glue to be placed on the fold to prevent loose sheets from falling out; gluing eliminates the possible post-folder operation of stitching

VI. Summary and Conclusion

A. Buckle folder

B. Knife folder

C. Combination folder

D. Web folder

E. Specialty folding operations

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

INTERACTION ITEMS:

1. When is a combination folder generally used? Why?
2. Where is the type of fold originally determined?
3. What advantage does a continuous-fed folder have over a pile or friction folder?
4. What can be used when folding across the grain to guarantee a smooth fold?
5. How does perforation on a right angle fold help straighten the fold?
6. Where do the gripper edges of the paper go on the feeder of the folder?
7. What happens when the double sheet detector is not set correctly?

CLASSROOM, LABORATORY, OR OTHER ACTIVITIES:

1. Using a table-top folder with friction feed, set plates to fold a letterhead into thirds.
2. Adjust the rollers on a buckle folder for different weights of paper.
3. Move delivery from single fold to right angle attachment.
4. Follow the web through the folding unit and determine how pages are placed in current order. Perform a quality check every 25th sheet to determine the squareness of the fold.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

EVALUATION ITEMS:

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 1. The suction type of feeder on a folder is the fastest.

____ 2. Slitting the sheet on the folder allows the operator to fold multiple copies simultaneously.

____ 3. The knife type of folder is the most accurate.

____ 4. The rollers on the second fold are set the same thickness as the sheet of paper.

____ 5. The right angle fold is used in a straight, parallel fold.

____ 6. Baffles are used to help contain the noise level of folders.

____ 7. The friction feeder is used on most table-top folders.

____ 8. Scoring is done on the final unit.

____ 9. The web folder is more precise than the combination folder.

____10. The former on a web press performs the cutting operation.

LESSON PLAN: 3

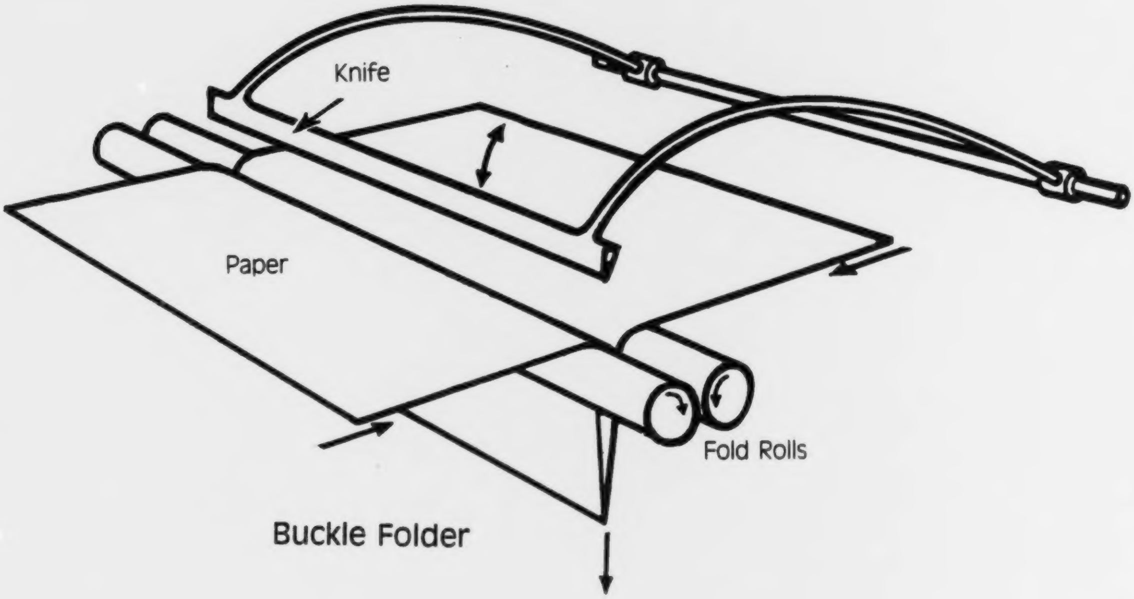
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

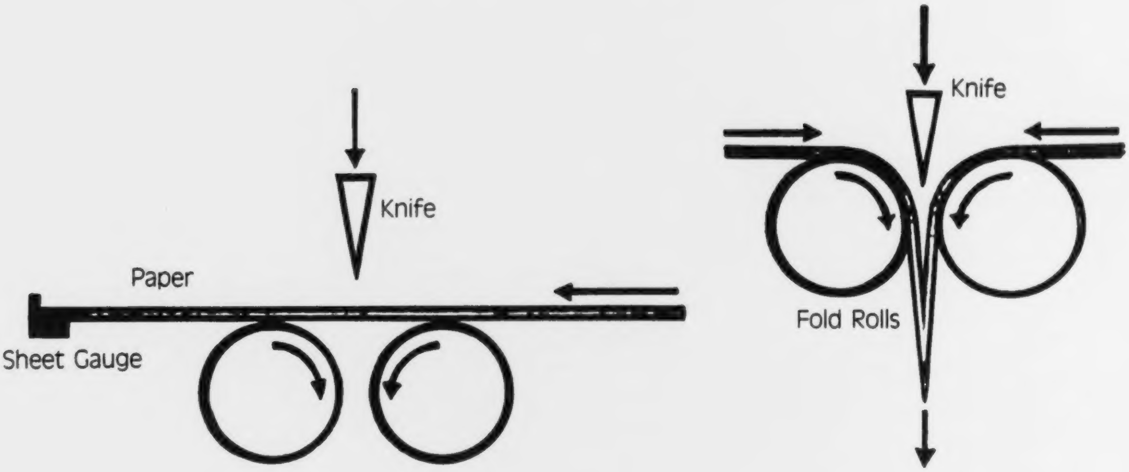
ANSWERS TO EVALUATION ITEMS:

1. F
2. T
3. T
4. F
5. F
6. T
7. T
8. F
9. F
10. F

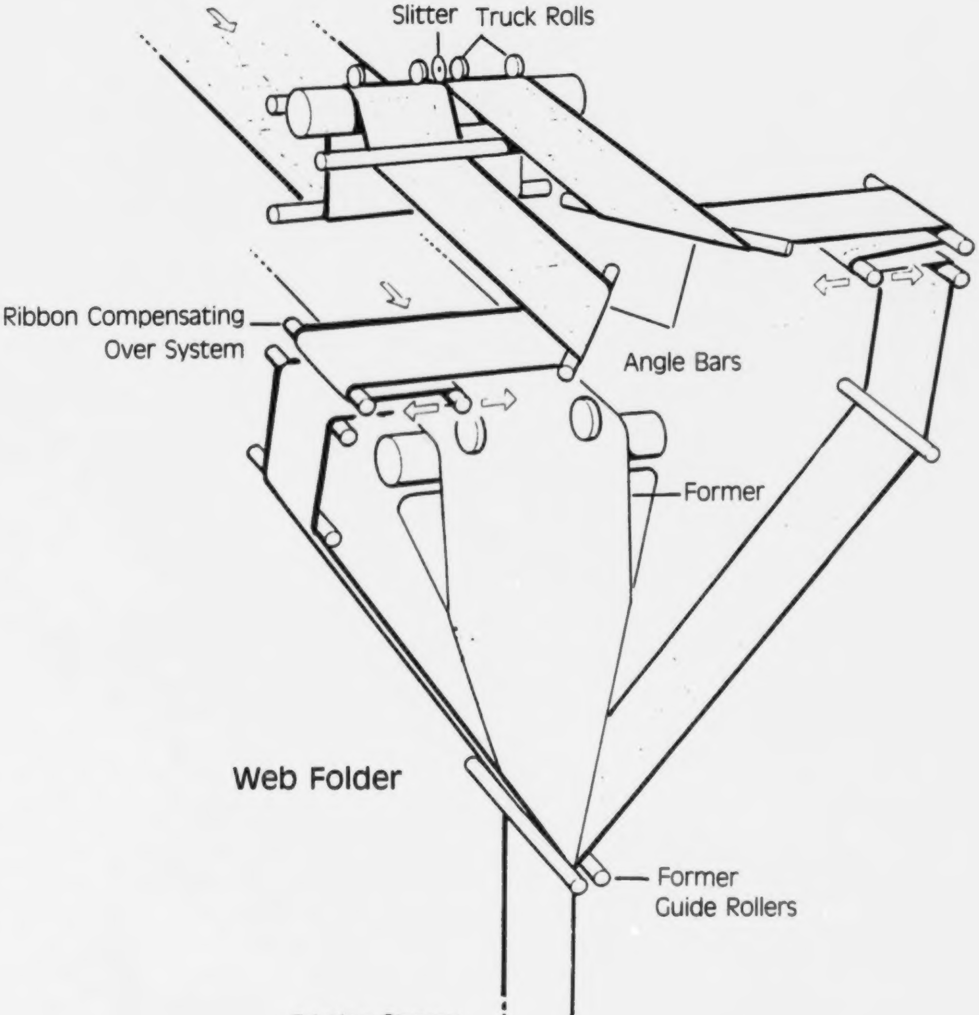
Types of Folders


Knife
Paper
Fold Rolls

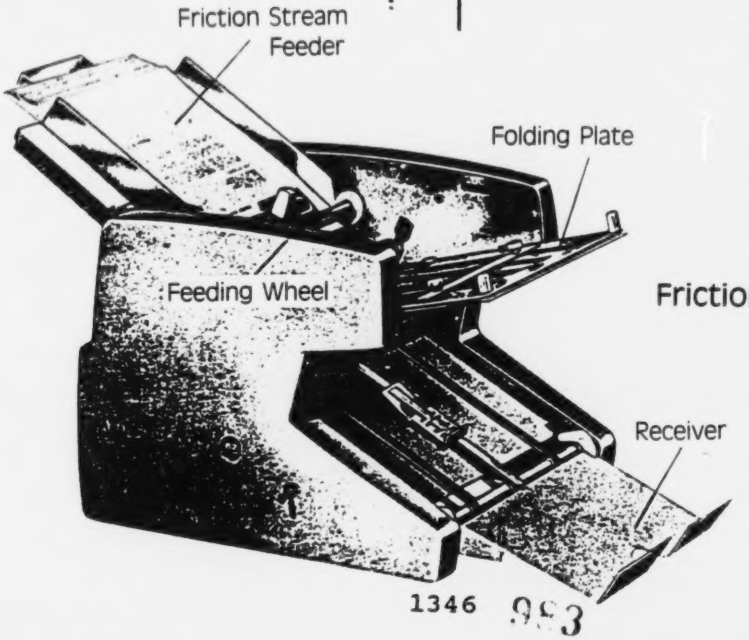
Buckle Folder


Knife
Paper
Sheet Gauge
Knife
Fold Rolls

Knife Folder


Slitter
Truck Rolls
Ribbon Compensating Over System
Angle Bars
Former
Former Guide Rollers

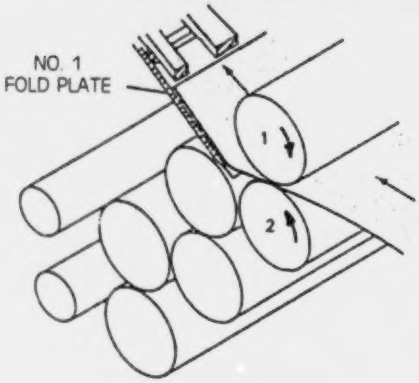
Web Folder


Friction Stream Feeder
Folding Plate
Feeding Wheel
Receiver

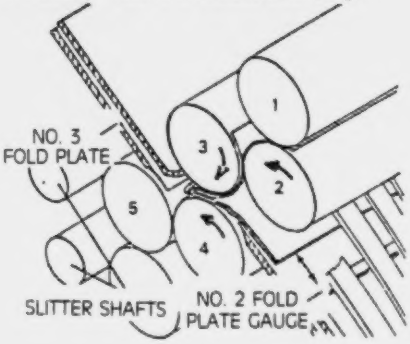
Friction Folder

Principle of a Buckle Folder

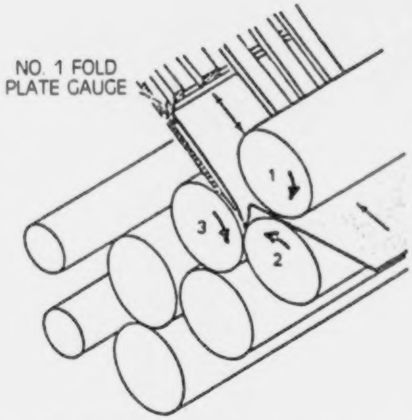
A Four-Plate Buckle Folder (Roller two is stationary)


NO. 1
FOLD PLATE
1
2

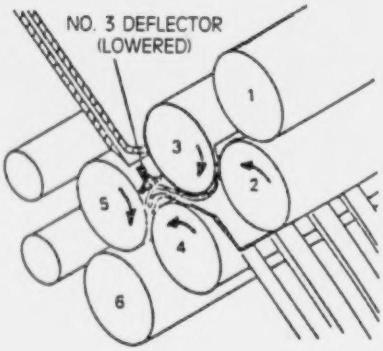
1. The sheet enters fold plate one.


1
NO. 3
FOLD PLATE
3
2
5
4
SLITTER SHAFTS
NO. 2 FOLD
PLATE GAUGE

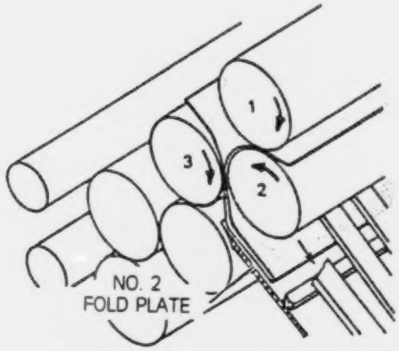
2. The sheet buckles and receives the first fold.


NO. 1 FOLD
PLATE GAUGE
1
3
2

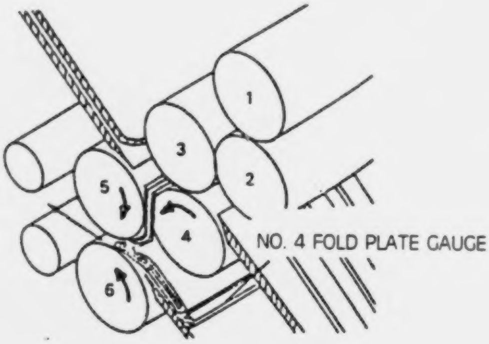
3. The once-folded sheet enters fold plate two.


NO. 3 DEFLECTOR
(LOWERED)
1
3
2
5
4
6

4. The sheet receives the second fold.

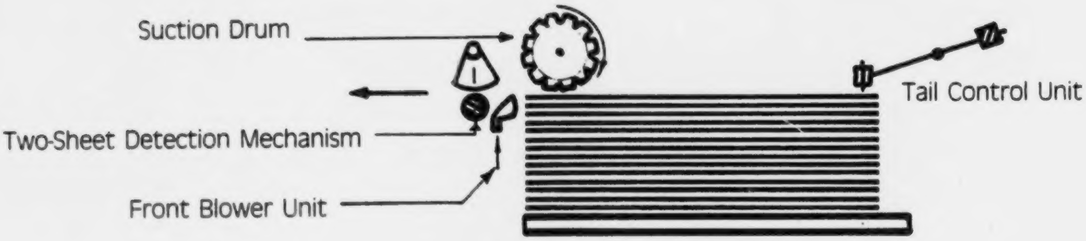

1
3
2
NO. 2
FOLD PLATE

5. The twice-folded sheet bypasses fold plate three.

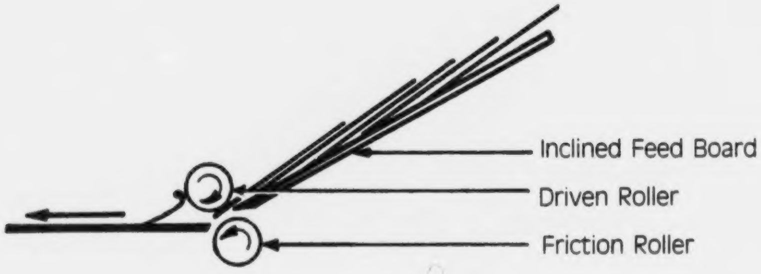

1
3
2
5
4
6
NO. 4 FOLD PLATE GAUGE

6. The sheet receives the third fold using the fourth fold plate.

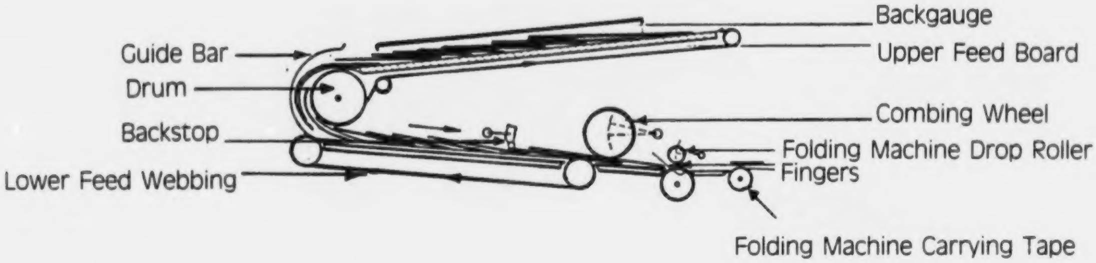
Types of Feeders


Suction Drum
Tail Control Unit
Two-Sheet Detection Mechanism
Front Blower Unit

Suction Feeder


Inclined Feed Board
Driven Roller
Friction Roller

Friction Feeder


Backgauge
Guide Bar
Upper Feed Board
Drum
Combing Wheel
Backstop
Folding Machine Drop Roller
Lower Feed Webbing
Fingers
Folding Machine Carrying Tape

Continuous Feeder

ASSIGNMENT SHEET 1 - DETERMINING PLATES AND SETTINGS FOR FOLDING JOBS

Directions: Determine which plates will be used to fold the following jobs and where the setting will be on each plate.

	Plate	Setting
1. Letter fold: 8½" x 11" letterhead, Gripper edge on top		
2. 4-page fold: 9" x 12" program, Gripper edge - page 1		
3. 6-page accordion: 9" x 12" program, Gripper edge - page 1		
4. Gate fold: 9" x 12", Unprinted		

ANSWERS TO ASSIGNMENT SHEET 1 - DETERMINING PLATES AND SETTINGS FOR FOLDING JOBS

	Plate	Setting
1.	1	7-3/8"
	2	3-5/8"
2.	1	6"
3.	1	3"
	3	3"
4.	1	9"
	2	6"

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

SCOPE OF UNIT:

Most printing jobs require a post-press finishing operation. This operation may be simply cutting jobs apart for folding, such as a program or brochure. It may be, and very often is, more complicated involving several operations. Collating may be followed by a binding step. The whole bindery area is probably the most overlooked area of the printing industry and is very possibly the most monotonous, often employing semiskilled labor.

INFORMATION TOPIC: XII-4 OR DEMONSTRATION:

COLLATING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify key points of hand collating.
2. Identify key points of machine collating.
3. Identify the purpose of control marks.
4. Plan layout for collating by hand.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Types of Collator Feeders
2. HO 2: Collator - Folder
3. HO 3: Types of Arm Gatherers
4. HO 4: Collating Marks
5. AS 1: Layout for Collating by Hand

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. *Comprehensive Graphic Arts*. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, unit 153, pp. 467-468.

Spence, Wm. P. and David G. Vequist. *Graphic Reproduction*. Peoria, IL: Charles A. Bennett, 1980, ch. 23, pp. 597-598.

Adams, J. Michael and David D. Faux. *Printing Technology*. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 21, pp. 519-522.

REFERENCES:

Walker, John R. *Graphic Arts Fundamentals*. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 12, pp. 209-211.

Cogoli, John E. *Photo-Offset Fundamentals*. Bloomington, IL: McKnight Publishing Company, 1980.

INTRODUCTION:

Boring work performed by inexperienced and inexpensive labor best describes hand collating. Many plants that print small books, booklets, and forms that require collating or gathering use these hand methods. Machine collators have grown in popularity and, coupled with a stitcher, produce a finished soft bound book efficiently. With more emphasis being placed on the bindery as a cost center, better and faster equipment is emerging.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

OUTLINE: (Key Points)

I. Collating - the assembling of folded sheets into the proper sequence to form a printed book (HO 1)

   A. Hand collating - assembling folded sheets by hand

      1. Facilities - table at the proper height for individual working in standing position

      2. Monotony - because it is a repetitious operation, monotony becomes a major factor resulting in mistakes and poor work

      3. Skills - long periods of standing, working with hands and fingers, and distinguishing between certain amounts of sheets of paper with fingers

   B. Machine Collating - mechanically collating signatures of paper in the proper order to form a printed product in the proper sequence

      1. Signature - sheet of paper printed in the proper layout

      2. Feeders - the methods of picking up a signature to be merged with the next signature

         a. Suction - suction is used to pick up one signature and place it in the proper sequence with the next signature

         b. Gripper - gripper action is used to pick up a signature

         c. Rotary - roller is used with either a gripper or suction to pick up the sheet

         d. Arm - an arm is used to move the signature; used in conjunction with suction or gripper

   C. On-line collators - collators that incorporate another operation in conjunction with the collating function; usually folding or trimming

1. Folding - an in-sequence operation in which signatures are picked up and placed in sequence and then folded before collating (HO 2)

2. Stitching - properly collated signatures are stapled together before leaving the machine

    a. Side - process where the stitching is placed on the fold side of the book

    b. Saddle - process where the stitching is placed on the fold

II. Gathering - the assembling of a flat sheet into the proper sequence to form the printed product (HO 3)

- A. Hand - horizontally or vertically assembled sheets of paper in the proper sequence
- B. Machine - the use of mechanical means to assemble sheets of paper

III. Collating Marks - marks used in both collating and gathering to insure the proper order of the sheets or sections (HO 4)

IV. Summary and Conclusion

- A. Collating
- B. Gathering
- C. Collating marks

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII: FINISHING OPERATIONS

INTERACTION ITEMS:

1. Why is monotony a problem when collating/gathering?
2. What type of concerns are associated with "lap" collators?
3. Why does side stitching/collating require extra concerns?
4. How are machine gatherers protected against double sheets? Empty bins?
5. What advantages are there to having the worker remain stationary and have the job move?
6. What problems exist if sheets are gathered and then folded?
7. What problems are there when printing precollated carbonless paper with two colors?

CLASSROOM, LABORATORY, OR OTHER ACTIVITIES:

1. Gather carbonless paper in the proper sequence. Check to see if the copy transfers from one sheet to the next by marking on the top sheet.
2. Collate book (to be saddle stitched) with small numbers up. Then turn them over and collate with fold to front. Compare differences in ease of picking up sheets.
3. Collate the same book for side stitch. What changes need to be made?
4. Set up hand collating operation to have several stations and several workers collating around the table. Improvise and have table move and workers remain stationary.
5. Using collating signature marks, collate sections of the book. Check the marks and determine the ease at finding a signature out of sequence.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

EVALUATION ITEMS:

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 1. The biggest factor in hand assembling a book is accuracy.

____ 2. Gathering is placing flat sheets in the proper sequence.

____ 3. Collators assemble only signatures that are folded evenly.

____ 4. Automatic gatherers detect when a sheet is in the wrong bin.

____ 5. Inspection of collated material is made easier by control marks.

____ 6. Saddle stitch collators sometimes use vacuum to open the signatures.

____ 7. Hand collating is necessary on hard case bound books.

____ 8. Layout, stripping and press are not concerned about collating methods.

____ 9. Most folded signatures have a closed head.

____10. Carbonless papers are all the same, just different colors.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

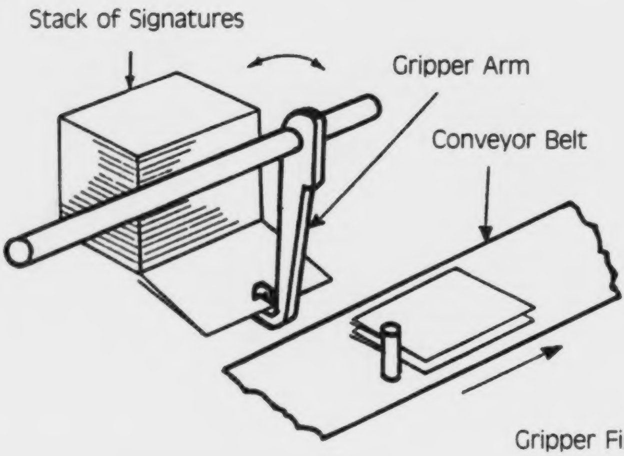
UNIT XII : FINISHING OPERATIONS

ANSWERS TO EVALUATION ITEMS:

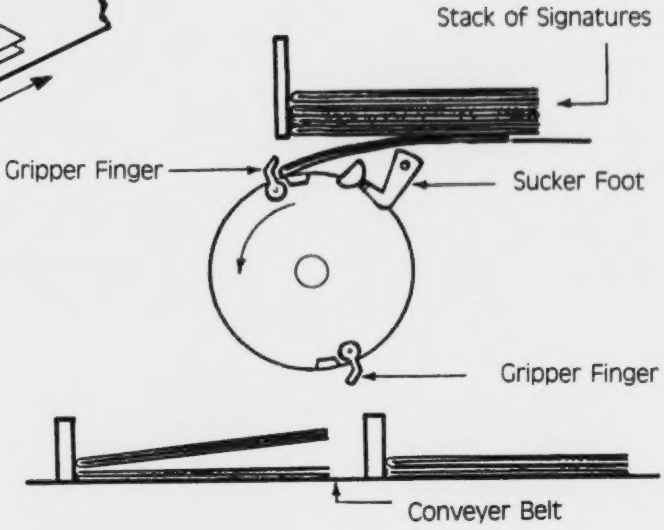
1. F
2. T
3. F
4. F
5. T
6. T
7. F
8. F
9. T
10. F

Types of Collator Feeders

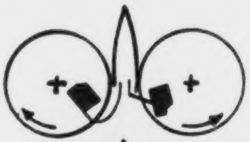
ARM


Stack of Signatures
Gripper Arm
Conveyor Belt

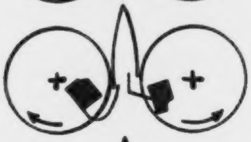
GRIPPER


Stack of Signatures
Gripper Finger
Sucker Foot
Gripper Finger
Conveyer Belt

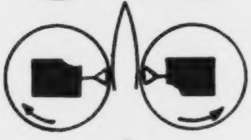
LAP GRIPPER/SUCKER



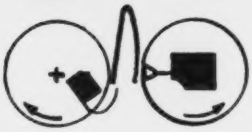
1. High-Folio Lap
   Lap grippers take long leg - opening gripper digs for short leg.



2. Low-Folio Lap
   Lap grippers take short leg - opening gripper takes long leg.

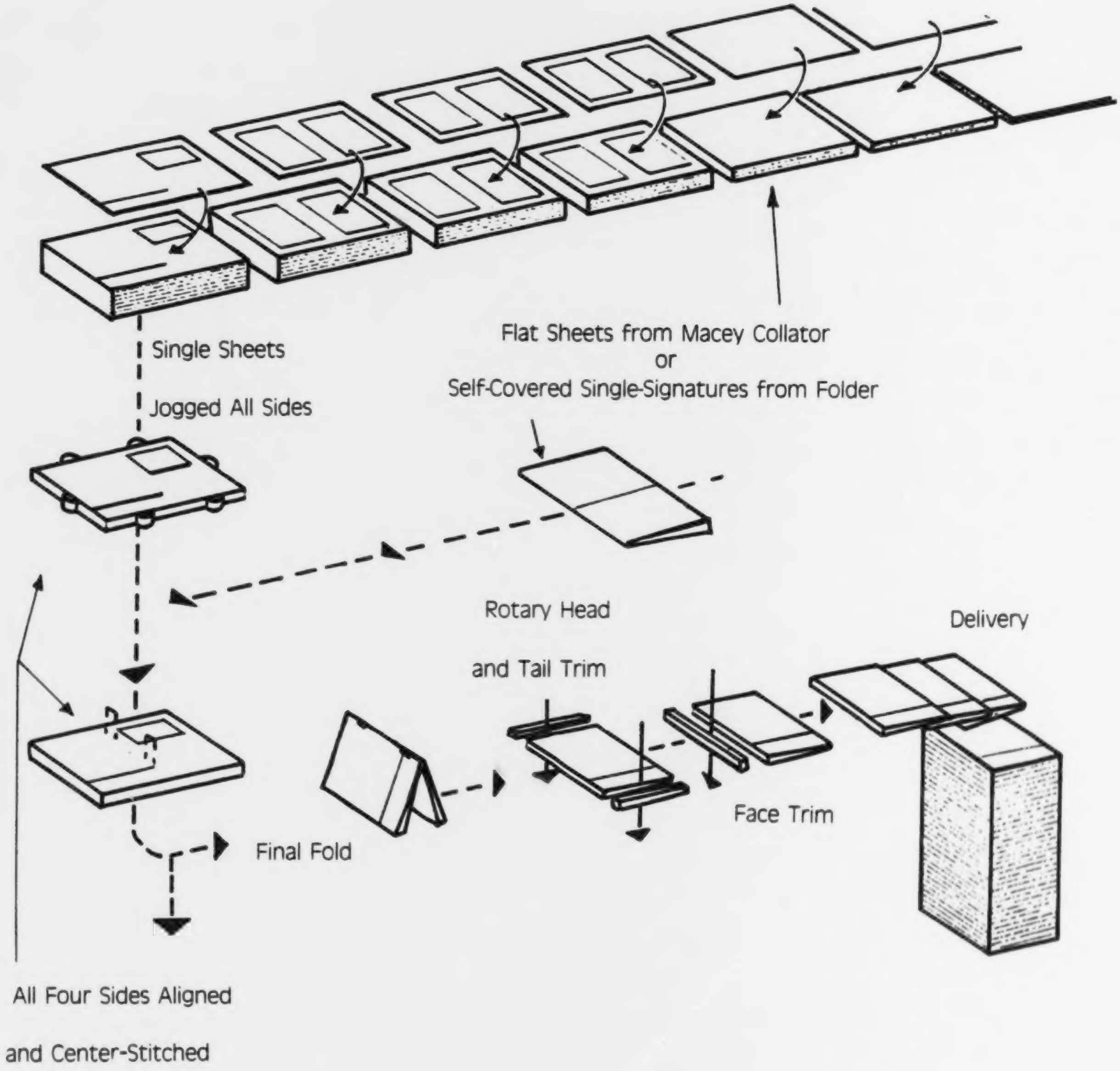


3. Normal Vacuum
   Front sucker takes front leg - rear sucker takes rear leg.



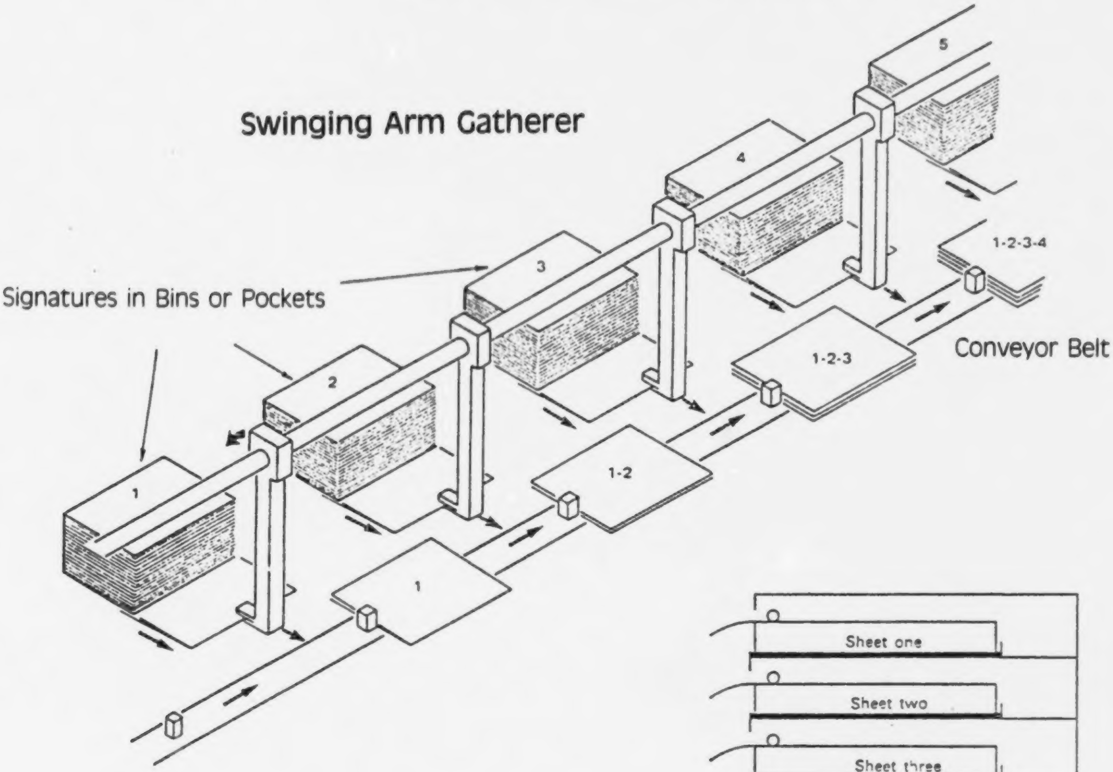
4. Parallel Fold/No-Lap
   Center sucker takes closed edge - opening gripper takes open edge.

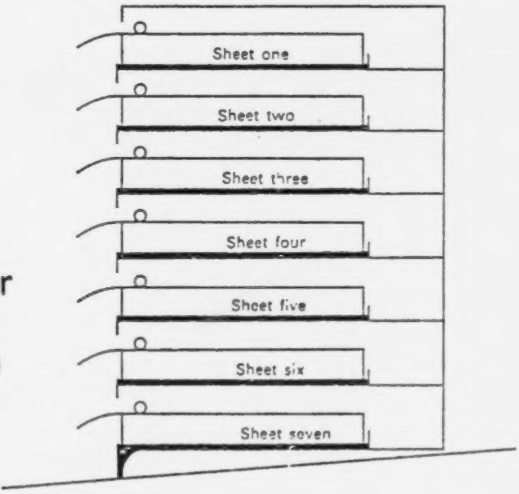
Collator - Folder


Single Sheets
Jogged All Sides
Flat Sheets from Macey Collator
or
Self-Covered Single-Signatures from Folder
Rotary Head
and Tail Trim
Delivery
Face Trim
Final Fold
All Four Sides Aligned
and Center-Stitched

Types of Arm Gatherers

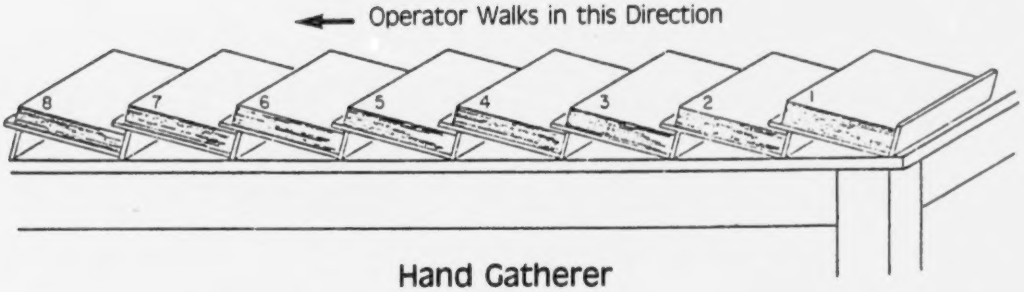
Swinging Arm Gatherer


Signatures in Bins or Pockets
1
2
3
4
5
1
1-2
1-2-3
1-2-3-4
Conveyor Belt


Sheet one
Sheet two
Sheet three
Sheet four
Sheet five
Sheet six
Sheet seven

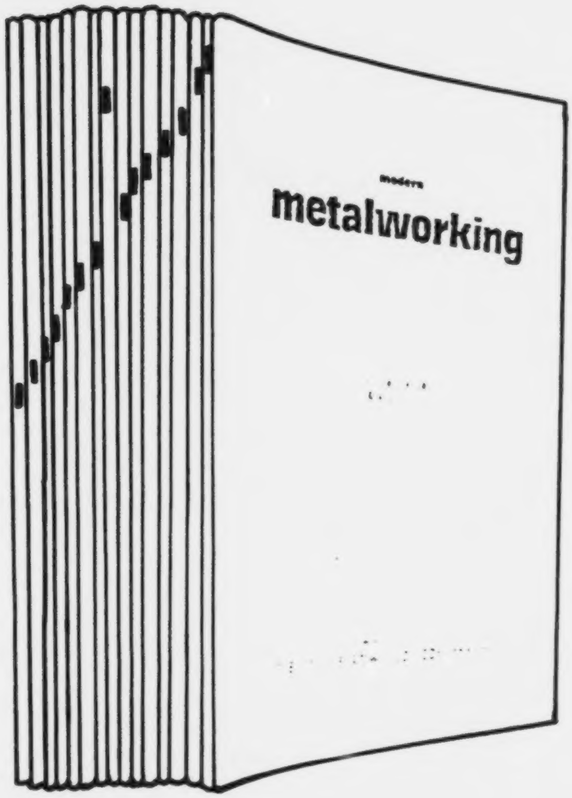
Vertical Gatherer

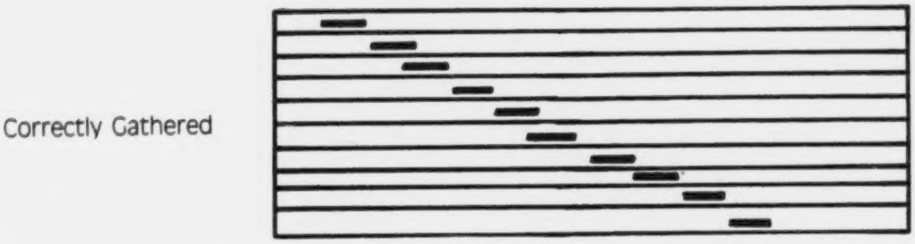
Top sheet ejected
ready for gathering

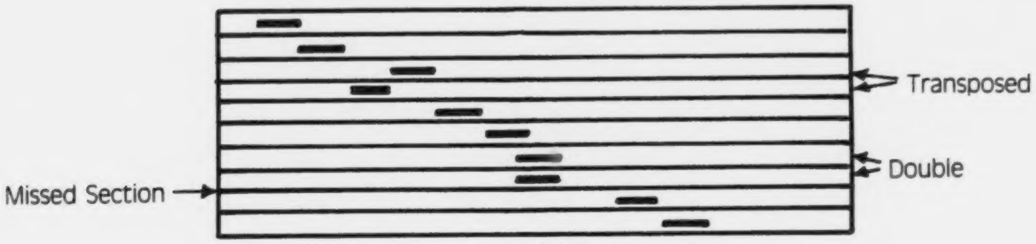

Operator Walks in this Direction
8
7
6
5
4
3
2
1

Hand Gatherer

Collating Marks


modern
metalworking


Correctly Gathered


Transposed
Double
Missed Section

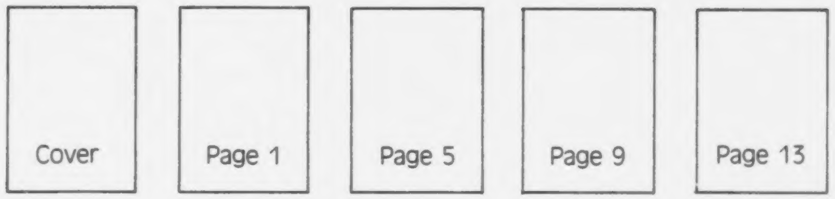
1371

AS 1

ASSIGNMENT SHEET 1 - LAYOUT FOR COLLATING BY HAND

Directions: A 32-page book has been right-angle folded in signatures of eight pages. A cover is printed and ready to be added. The job will be hand collated and saddlestitched. Set up a table layout by drawing a diagram below to show how the job can be hand collated.

ANSWERS TO ASSIGNMENT SHEET 1 - LAYOUT FOR COLLATING BY HAND



Work right to left.

NOTE: The job is easier to hand collate if signatures are turned upside-down. The folded top (closed head) will be easier to pick up than the loose sheet ends.

Top pages when upside-down are:

Page 1 would show page 32
Page 5 would show page 28
Page 9 would show page 24
Page 13 would show page 20

Back cover would show instead of cover.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

SCOPE OF UNIT:

Most printing jobs require a post-press finishing operation. This operation may be simply cutting jobs apart for folding, such as a program or brochure. It may be, and very often is, more complicated involving several operations. Collating may be followed by a binding step. The whole bindery area is probably the most overlooked area of the printing industry and is very possibly the most monotonous, often employing semiskilled labor.

INFORMATION TOPIC: XII-5 OR DEMONSTRATION:

BINDING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify characteristics of wire binding.
2. Identify characteristics of adhesive binding.
3. Identify uses of loose-leaf binding.
4. Identify key points related to drilling.
5. Identify purposes of corner-rounding.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Types of Binding
2. HO 2: Perfect Binding Techniques
3. HO 3: Automatic Collator - Stitcher
4. HO 4: Gang Paper Drill/Round Cornering Machine
5. Video Tape GA-88-190: Binding. Available from The Media Center, State Fair Community College, 1900 Clarendon Rd., Sedalia, MO 65301 (816) 826-7100

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch. 23, pp. 599-618.

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 21, pp. 522-528.

REFERENCES:

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 12, pp. 213-233.

Cogoli, John E. Photo-Offset Fundamentals. Bloomington, IL: McKnight Publishing Company, 1980, ch. 15. pp. 281-283.

INTRODUCTION:

This unit covers the bindery operations--adhering sheets together is one of the many binding types. After jobs have been trimmed, folded and/or collated/gathered, they are often bound by one of various binding methods. This unit explores the many methods of binding paper.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII: FINISHING OPERATIONS

OUTLINE: (Key Points)

I. Wire (HO 1, HO 2)

  A. Staple - a staple is of predetermined length and formed prior to being forced into the paper; a maximum length for stapling is about one-half inch in thickness (HO 3)

    1. Side - forcing the staple into the flat surface of the paper; side stapling requires 1/4" margin on sheet for staple

    2. Saddle - forcing the staple into the folded surface of the paper

  B. Stitching - stitching is forcing the wire into the paper from an adjustable roll of wire; there are varying weights of wire that can be adjusted to various thicknesses; stitching can be done side or saddle as above

  C. Spiral - wire is forced into prepunched holes in a spiral configuration; spiral wire binding will open flat, an advantage over side and saddle

II. Adhesive

  A. Cold - adhesive that is applied to the edge of paper cold; cost is less and durability is shorter; pressure is applied to the sheets prior to application of adhesive; common term for application is "padding"

  B. Hot - higher quality adhesive that is more durable; used with perfect binders; often applied to a roughened surface to enhance durability

  C. Carbonless - a special chemically treated cold adhesive applied to carbonless paper; the chemical reaction allows the sets to be separated but sheets in the sets adhere to each other

III. Loose-Leaf

  A. Three-ring - most popular binding method; it has numerous advantages such as the easy addition of pages and the ability to lie flat

B. Plastic - plastic binding requires a special punch to holes in paper; book will lie flat, however, addition of pages is not as easy as three-ring

C. Plastic spiral - same as wire spiral except plastic is used; very difficult to add pages to book

D. Post - metal posts that can be made taller with extenders; there is no limit to thickness; often used singularly to hold pages together; post caps are screwed on for convenient access

IV. Drilling - drilling is accomplished with single hole or multiple station bits forced through paper; thickness of paper is usually about two inches; a variety of sizes of bits are available (HO 4)

V. Corner-Rounding - an option to the square corner common in the printing industry; rounded die is forced through a stack of paper causing the square corner to be cut off (HO 4)

VI. Summary and Conclusion

A. Wire

B. Adhesive

C. Loose-leaf

D. Drilling

E. Corner-rounding

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

INTERACTION ITEMS: DRILLING

1. What bindery methods require the drilling of stock?
2. What regulates the size and location of the hole in loose-leaf binders?
3. How many sheets can be drilled at one time?
4. What problems result when drill bits become dull?
5. What type of stock drills best?
6. What different types of drilled patterns are there? Why?

CLASSROOM, LABORATORY, OR OTHER ACTIVITIES:

1. Determine how many sheets can be used for the following type of binders.
    a. 1/4" plastic
    b. 3/4" plastic
    c. 1" plastic
    d. standard 3-ring note book
    e. 1" post binder

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

INTERACTION ITEMS: WIRE

1. What are the thickness limitations of wire binders?
2. What layout criteria is needed for side binding? Saddle binding?
3. Why do automatic stitchers stagger the staple?
4. How is the wire formed in a stitcher?
5. How is the wire formed for spiral binding? What limits the width of the sheet in a saddle stitcher?

CLASSROOM, LABORATORY, OR OTHER ACTIVITIES:

1. Using a regular stapler, how many sheets of bond paper can be stapled?
2. Using heavier staples, check to see if more sheets can be stapled.
3. Check the ease in converting a saddle stitcher to side stitching and back to saddle stitching.
4. Check the minimum and maximum number of sheets stapled on a stitcher. What clenches the wire? What determines the width of paper to be saddle stitched?

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

INTERACTION ITEMS: ADHESIVES

1. What advantages do cold adhesives have over hot adhesives? What are the advantages of hot adhesives?

2. When padding carbonless paper, how do the sets get separated?

3. How do perfect binding machines strengthen the adhesive to the sheet?

4. Special machines pad sheets automatically. How? Can they be trimmed after the adhesive has been applied?

CLASSROOM, LABORATORY, OR OTHER ACTIVITIES:

1. Using scrap paper, cut paper to convenient size and using a padding press, apply padding compound to edge of paper. Is one coat enough?

2. Pad carbonless paper with regular padding compound and carbonless compound. Compare the difference.

3. Using scrap paper, make two stacks of scrap paper. Pad one stack brushing the padding compound toward the center. Pad the other stack, brushing toward the edges. Which gives the best results?

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

INTERACTION ITEMS: LOOSE-LEAF

1. What are the advantages of loose-leaf binders over other binding methods? What are the limitations of loose-leaf binders?
2. Which type of loose-leaf binders are most difficult to add pages to? Which are the easiest?
3. Plastic binders are becoming more popular. Why?
4. How do the margins need to be adjusted when using loose-leaf binders?
5. Which loose-leaf method is the most versatile?
6. What limits the number of sheets when using plastic binders? Three-ring binders?

CLASSROOM, LABORATORY, OR OTHER ACTIVITIES:

1. Using a plastic binder and following instructions, make books for use in the lab. What problems were encountered when punching the sheets? When opening the plastic binder?
2. Drill/punch holes for a 3-ring notebook. Note that the margins need to be made different for the size of the notebook and the size of the hole. What changes, if any, need to be made for the use of posts?

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

EVALUATION ITEMS:

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 1. Books that are saddle stitched require an extra margin on one side.

____ 2. Spiral binding allows a book to lie flat.

____ 3. Carbonless paper padding requires a hot adhesive.

____ 4. A hot adhesive has less strength than a cold adhesive.

____ 5. Perfect binders often roughen the surface to be bound to help the adhesive adhere to the paper.

____ 6. Three-ring binding is the most popular loose-leaf binder.

____ 7. Drilling stock is limited to a few sheets at one time.

____ 8. Drill bits come in one size.

____ 9. Corner-rounding is a decorative operation.

____10. Loose-leaf posts can be extended to hold more sheets.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

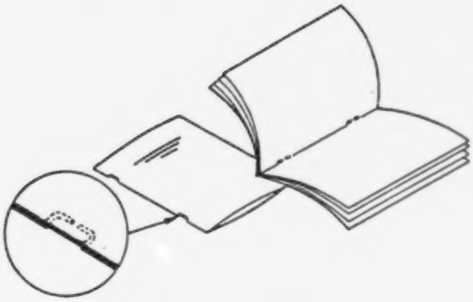
UNIT XII : FINISHING OPERATIONS

ANSWERS TO EVALUATION ITEMS:

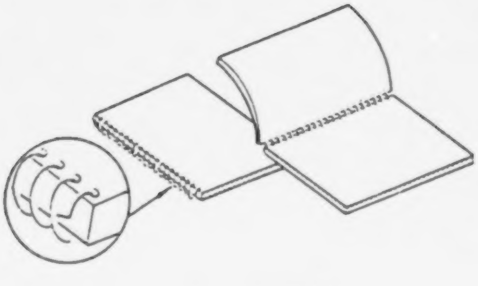
1. F
2. T
3. F
4. F
5. T
6. T
7. F
8. F
9. T
10. T

HO 1

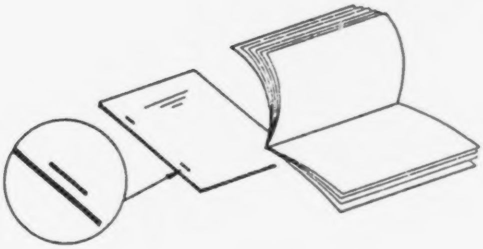
Types of Binding



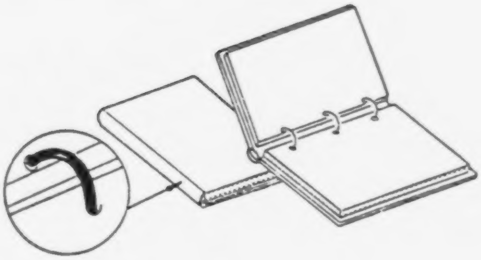
SADDLE STITCH



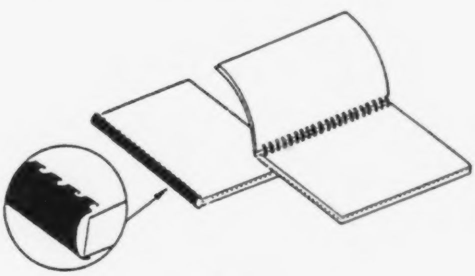
WIRE SPIRAL



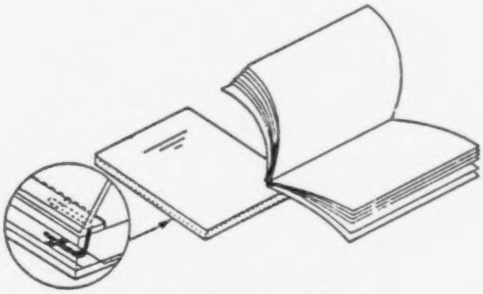
SIDE STITCH



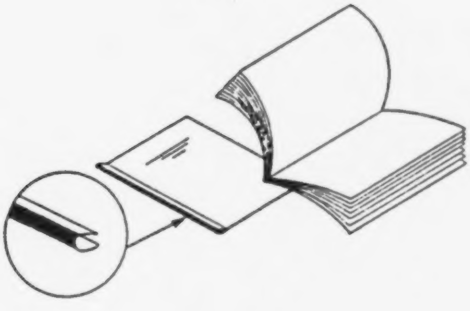
RING



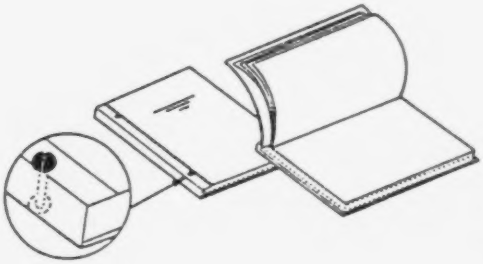
PLASTIC



BASE AND PRONG



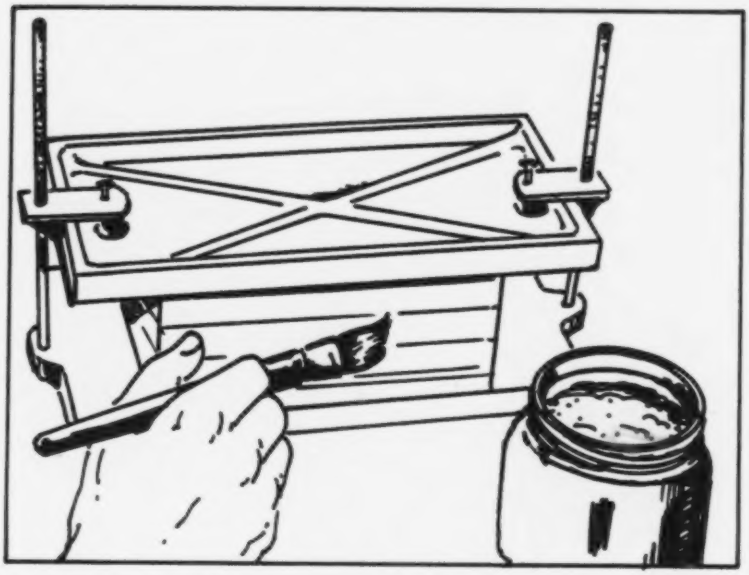
PLASTIC U-CHANNEL



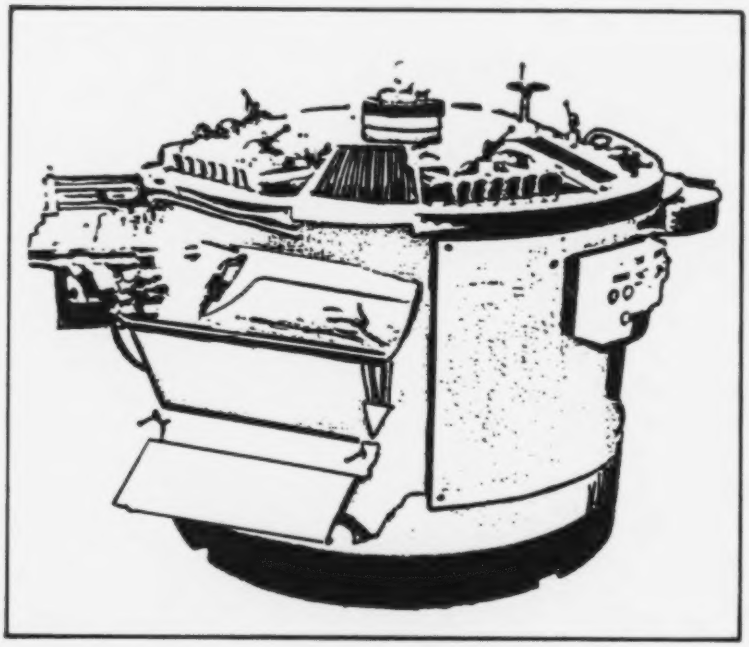
POST

HO 2

Perfect Binding Techniques



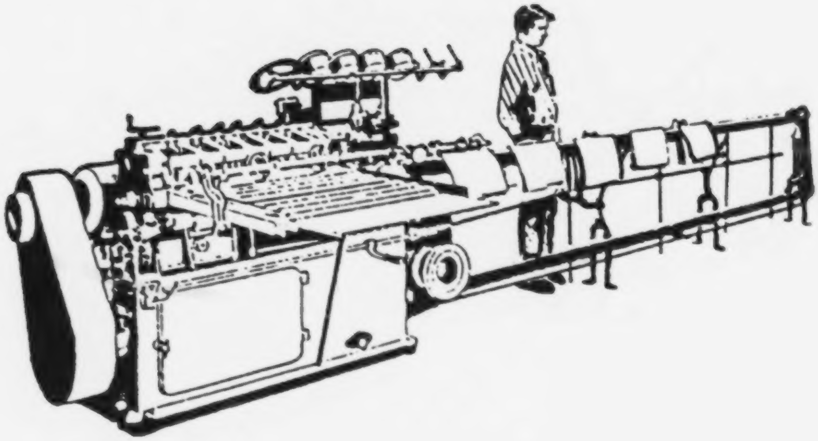
Simple Padding Technique

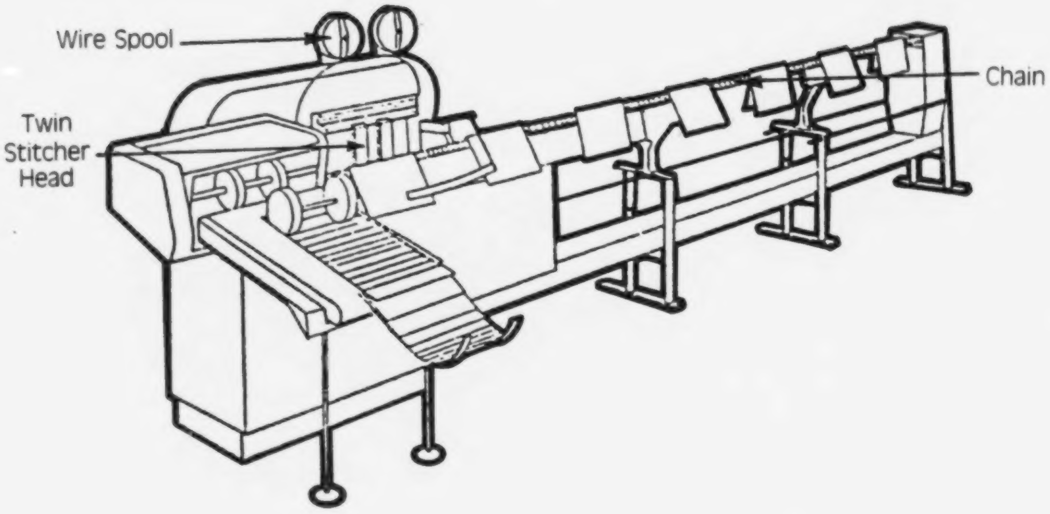


Perfect Binding Machine

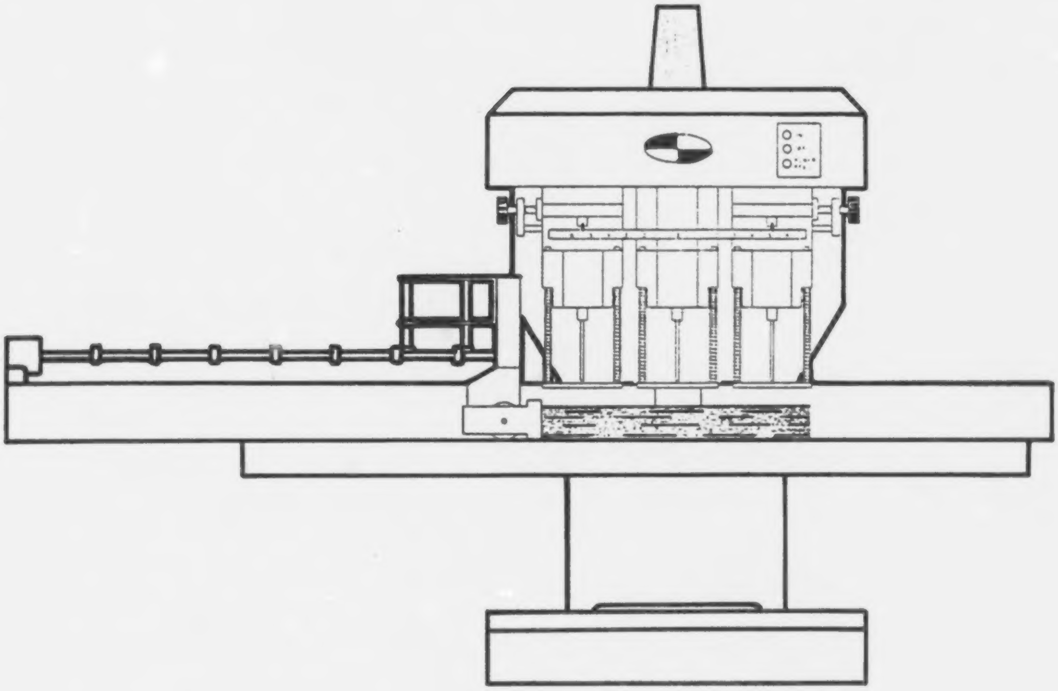
HO 3

Automatic Collator-Stitcher

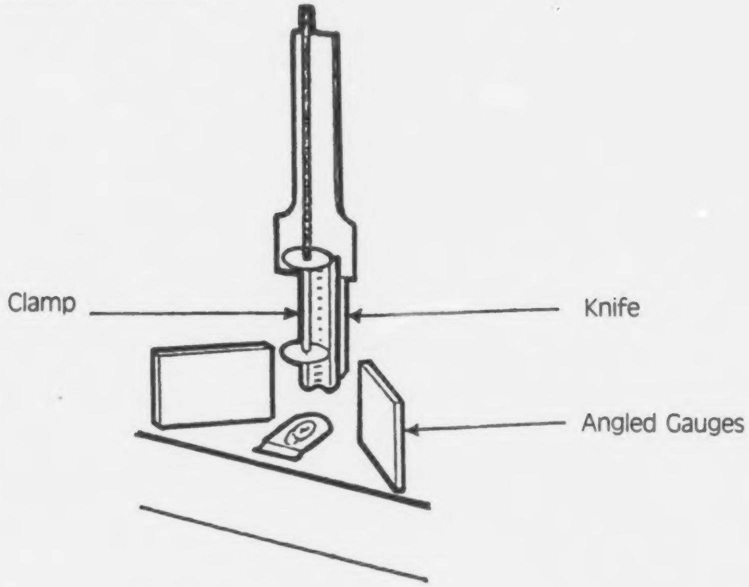



Wire Spool
Twin Stitcher Head
Chain

Gang Paper Drill/Round Cornering Machine



Round Cornering Machine


Clamp
Knife
Angled Gauges

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

SCOPE OF UNIT:

Most printing jobs require a post-press finishing operation. This operation may be simply cutting jobs apart for folding, such as a program or brochure. It may be, and very often is, more complicated involving several operations. Collating may be followed by a binding step. The whole bindery area is probably the most overlooked area of the printing industry and is very possibly the most monotonous, often employing semiskilled labor.

INFORMATION TOPIC: XII-6 OR DEMONSTRATION:

BOOK BINDING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Match book binding terms to correct definitions.
2. Describe differences in quality of casebound books.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Casebound Process
2. HO 2: Parts of a Casebound Book
3. HO 3: Web Method of Casebinding Covers

INFORMATIONAL ASSIGNMENT: (Student)

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch. 23, pp. 599-602.

REFERENCES:

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 12, pp. 217-233.

INTRODUCTION:

Casebound books have been made since the invention of printing. It is the most expensive method of binding books and consists of three operations: assembling the inner pages, binding the inner pages, and casing in the cover. Casebinding was one of the last bindery operations to be automated.

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

OUTLINE: (Key Points)

I. Casebinding (HO 1, HO 2)

   A. Inner page assembly - the operation involving the assembly of sheets or signatures into a book

      1. Gathering - the assembly of all elements of a book except the cover

      2. Square - the unit after all elements of the book have been gathered

      3. Binding - adhering the square into a single unit, usually done with thread

      4. Nipping - using pressure to squeeze air out of the square and to reinforce folded edges

      5. Trimming - cutting all sides of the square except the spine side

   B. Forwarding operation - preparing the square for the addition of the cover

      1. Rounding - making the backbone convex to allow book to stay open

         a. Backbone - the part of the book that is seen when placed upright on the shelf

         b. Spine - another name for backbone

      2. Backing - using a hammer-like object to flange out the backbone, forming somewhat of a hinge

      3. Crashing - adding along the backbone a fabric called crash to support the binding; paper called "super" may also be added

      4. Headbanding - a cloth strip added at both the top and bottom of the backbone, mainly for decoration but also protects sheets as the book is pulled from the shelf

   C. Casing-in operation - the operation of attaching the hard cover to the square (HO 3)

1. Casemaking - the process of preparing the cover for the book; it involves placing stiff paper boards in the proper position on the cover material and forming the corners

2. Tipping - the operation of gluing the endsheets to both the cover and the square

II. Quality of Casebinding

A. Inexpensive quality - a casebound book that leaves out some of the above operations or uses less expensive materials; a book that may be printed with improper grain direction, eliminating the backing operation or less thread used in the binding operation

B. Excellent quality - use of good materials and not eliminating any of the operations; often includes additional finishing operations to the cover such as embossing, foil stamping, and marbling

III. Summary and Conclusion

A. Casebinding

B. Quality of casebinding

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

INTERACTION ITEMS:

1. What are the three operations that are involved in the casebinding method of binding books?

2. Describe the various terms involved in inner page book assembly?

3. How is the square prepared for its cover?

4. What is the casing-in operation?

5. What is the differences between inexpensive and excellent methods of casebinding?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

EVALUATION ITEMS:

For each of the following, match the term to the correct definition by writing the letter in the blank.

____ 1. Gathering
____ 2. Rounding
____ 3. Square
____ 4. Signature
____ 5. Spine
____ 6. Crashing
____ 7. Tipping
____ 8. Headband
____ 9. Nipping
____10. Casing-in

a. Gluing end sheets to both covers and the square

b. Strip of cloth added to square for decoration

c. Adding fabric and/or paper to the backbone

d. The part of the book seen when on the shelf

e. Assembly of sheets into a unit

f. Squeezing air from the square

g. The unit after all elements have been assembled

h. Attaching the cover to the square

i. Forming the backbone to allow book to lay flat

j. A single or folded sheet to be used in the book

11. Describe differences in quality of casebound books:

    a. Inexpensive quality -

    b. Excellent quality -

LESSON PLAN: 6

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XII : FINISHING OPERATIONS

ANSWERS TO EVALUATION ITEMS:

1. E
2. I
3. G
4. J
5. D
6. C
7. A
8. B
9. F
10. H
11. a. Inexpensive quality - a casebound book that leaves out some operations or uses less expensive materials; a book that may be printed with improper grain direction, eliminating the backing operation
    b. Excellent quality - use of good materials and not eliminating any of the operations; often includes additional finishing operations to the cover such as embossing, foil stamping, and marbling

HO 1

CASEBOUND PROCESS

(1) The customer is sent a "check copy" (a set of folded, gathered, and trimmed signatures) for final checking before binding.

(2) The first and last signatures of a casebound book now go to the tipping machine. A four-page section, known as an endsheet, is glued or tipped to the 32-page signature by a little bead of glue near the spines of the signatures.

(3) The first and last signatures with the endsheets attached join the rest of the signatures for the book in a staging area by the gathering machine. The signatures are loaded into hoppers on the gathering machine. Swing arms with air suckers grab the protruding lip on the signatures and drop them onto a moving conveyor. The signatures drop on top of each other so when they reach the end of the line there is a complete book of folded and gathered signatures. These book bodies are known as F's and G's.

(4) The gathered signatures are stacked on a skid if the book is to be sewn. There are several sewing methods used for books: Smyth sewing through the bindfold, sidesewing and oversewing. If a book is adhesive bound, the entire operation is done in-line; that is, the gathering machine and an adhesive binder and other equipment are connected for minimum handling.

(5) If Smyth sewn, the books are forwarded to the smashers and nippers. The books are compressed to a uniform thickness.

The nippers are jaws that open and close along the binding edge of the book. They compress the book uniformly. A light adhesive or glue is applied to the backbone while in the nippers. This adhesive gives the book some degree of rigidity.

(6) Sewn or adhesive bound books are now fed through a three-knife trimmer. The head, face, and foot of the books are trimmed flush. Now the books are forwarded to the rounder-backer.

(7) The books are fed into the rounder-backer and caught by two rollers which turn against the book body as it is being elevated. This action forms a round and prevents the interior signatures of a book from protruding out beyond the cover when bound. Next, the books are caught in a vise within the rounder-backer. The books are held stationary while a jointing iron is rocked back and forth over the backbone with a great deal of pressure. This action forms the joints or hinges for the case covers. The books are now sent to the lining machine.

(8) The lining machine applies an application of hot melt adhesive and/or animal glue to the backbone of the book. Before the glue can solidify, a capping station in the machine applies a course fabric called "super" or "crash." A second application of glue is made and another capping station applies Krinkle Kraft™ paper as well as headbands and footbands. Now that the backbones have been reinforced, the books are sent to the casing-in machine.

(9) The casing-in machine transports the books in jaws through a glue station where the outside of the endsheets are completely covered with a PVA glue or paste. Before the glue can set, the books are inserted into the cases. The books are transferred to the building-in machine. The casing-in and building-in steps are often incorporated into one machine.

(10) The building-in machine traps the books in between platens and presses them repeatedly while the glue between the endsheets and boards in the case sets up or dries. The books are now ready for quality control inspection, wrapping of dust jackets, and packaging.

(11) Cases for the books are constructed and decorated while the books are being sewn, nipped, glued, trimmed, rounded, etc. Binder's boards of a specified caliber are cut to size on a rotary cutting machine. The boards are fed as large sheets and delivered as strips. The strips are fed back through the cutter, yielding case-size boards.

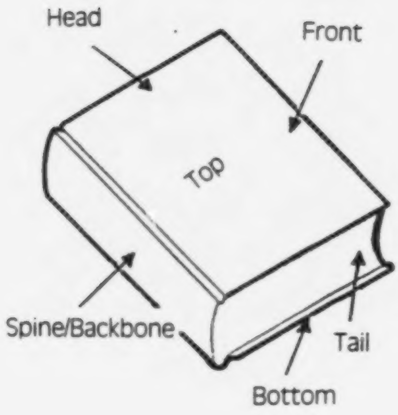
(12) Cloth of a specified type, color and finish is purchased in bolts 38" to 52" wide by 60 or more yards long. The cloth is sheeted on a specialized cutter that slits width-wise and chops to a predetermined running length in one pass through the machine. The corners of the cloth sheets are cut and sent to the casemaking machine.

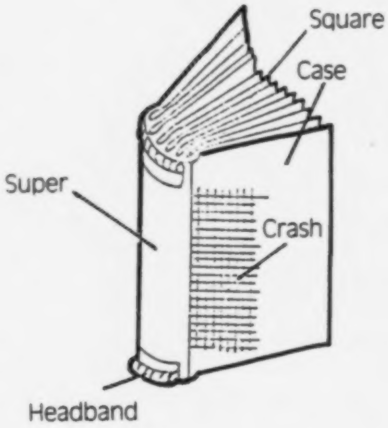
(13) The casemaker coats the cloth on one side with animal glue. A revolving swing arm or picker head places two boards and a backbone liner on the glued cloth. A series of rollers

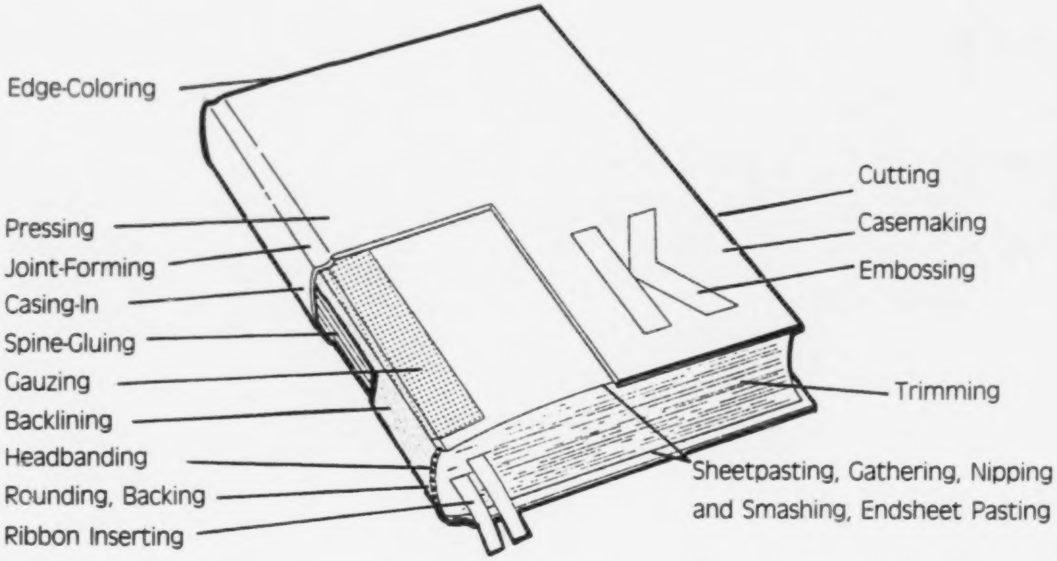
tucks the edges of the cloth over onto the boards. The rollers continue pressure long enough for the glue to set, while the cloth is turned in over the boards.

(14) Next, the cases are decorated by hot foil stamping with roll leaf or inking on a platen press. Cover material can be decorated via screen printing or offset printing prior to casemaking. In hot foil stamping, a magnesium, brass, or copper die is mounted on a heated platen. Roll leaf foil in a specified color is web-fed over the face of the stamping die. The platens are closed together with a good deal of pressure and heat that causes the pigments to be transferred from the roll leaf to the case. The decorated cases are sent to a staging area by the casing-in machine to await joining with books.

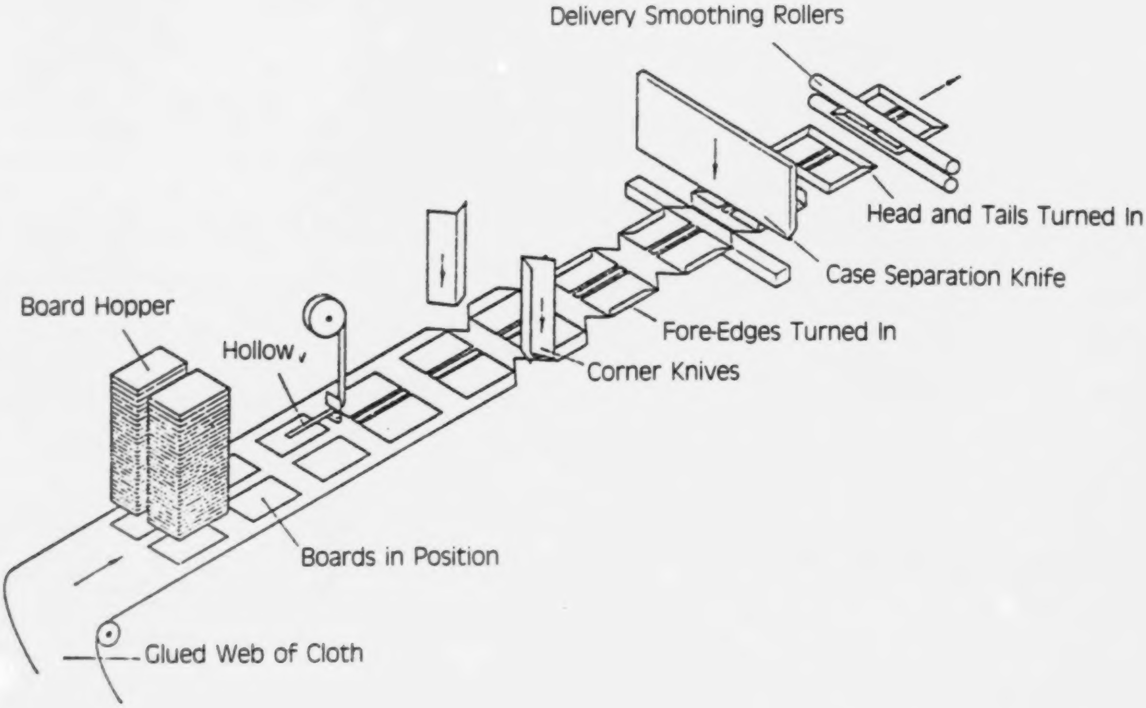
Parts of a Case Bound Book


Head
Front
Top
Spine/Backbone
Tail
Bottom


Square
Case
Super
Crash
Headband


Edge-Coloring
Cutting
Casemaking
Embossing
Pressing
Joint-Forming
Casing-In
Spine-Gluing
Gauzing
Backlining
Headbanding
Rounding, Backing
Ribbon Inserting
Trimming
Sheetpasting, Gathering, Nipping and Smashing, Endsheet Pasting

Web Method of Casebinding Covers


Delivery Smoothing Rollers
Head and Tails Turned In
Case Separation Knife
Fore-Edges Turned In
Corner Knives
Board Hopper
Hollow
Boards in Position
Glued Web of Cloth

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

SCOPE OF UNIT:

To successfully produce a quality printed product, the paper must be the right kind, the right condition, the right cut and the right amount. This emphasizes the need to keep paper in that condition until it is ready for the pressroom and then counted and cut correctly. Because of its weight, safety becomes a major concern when handling paper. Proper handling of all materials is a major factor to consider.

INFORMATION TOPIC: XIII-1 OR DEMONSTRATION:

PAPER
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify true statements relating to sizes of paper.
2. Identify true statements relating to weights of paper.
3. Differentiate between characteristics of various classes of paper.
4. Identify information found on paper carton label.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Basic Size/Weights of Common Papers: Ream Weight by Size
2. HO 2: Inch to Millimeter Conversion Table for Paper Sizes
3. HO 3: Classes of Paper
4. HO 4: Paper Carton Label
5. Video Tape GA-88-170: Paper. Available from The Media Center, State Fair Community College, 1900 Clarendon Rd., Sedalia, MO 65301 (816)826-7100

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 19, unit 164, pp. 517-523.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch. 25, pp. 652-656.

Adams, J. Michael and David D. Faux, Printing Technology, 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 20, section 1, pp. 484-493.

REFERENCES:

Bureau, William H. What the Printer Should Know About Paper. Pittsburgh, PA: Graphic Arts Technical Foundation, 1982.

INTRODUCTION:

This lesson provides a basic understanding of the kinds of paper. It introduces the basic terms used when working with paper and provides tips for selection of the proper paper for a particular printing job.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

OUTLINE: (Key Points)

I. Characteristics of Paper Handling (HO 1, HO 2)

   A. Basic size - predetermined size assigned to a class of paper

   B. Basic weight - designated fixed weight of 500 sheets of paper of the basic size, used as the basis for measuring the substance of paper by weight

   C. Ream - 500 sheets of paper, regardless of the size or weight

   D. Regular size - any of a number of sizes of paper available at the basic weight

II. Classes of Paper (HO 3)

   A. Book paper - paper manufactured to be printed on both sides as used in books and pamphlets; must have a high degree of opacity

      1. Coated - paper manufactured with a glossy coating

      2. Uncoated - paper manufactured with a dull printing surface to reduce glare

   B. Business paper - paper designed for use in the operation of a business

      1. Bond - letterpress paper for letterheads, communications, and other correspondence that has a short life

      2. Ledger - heavier, more durable paper that will withstand time and handling, as those required for record keeping

      3. Writing - paper suitable for writing with pen and ink and pencil

      4. NCR - "no carbon required" - paper that transfers printing from sheet to sheet with pressure, without the use of carbon paper

C. Cover paper - paper designed for much handling, folding, bending and wear

  1. Coated - paper manufactured with a glossy coating

  2. Uncoated - paper manufactured with a dull printing surface to reduce glare

D. Bristol paper - paper generally used for printing records, filing cards, folders, and self-mailers

E. Miscellaneous - paper used for a variety of purposes

  1. Paperboards - rough paper stock usually used for boxes, signs and corrugated containers

  2. Newsprint - paper used in the printing of newspapers; designed for a very short life

  3. Thins - paper that is very thin and can be used for tracing; also requires less storage space when filed

III. Carton Label - a label placed on a carton to indicate paper information without having to open the carton (HO 4)

A. Manufacturer - the paper mill that manufactures the paper

B. Size - the size of the paper, usually given in both English and metric measurements

C. Grain direction - the direction of the grain of the paper is either stated, or a line is placed under one of the size dimensions

D. Basic weight - the basic weight is indicated by the subnumber

E. Finish - the type of finish put on the paper by the manufacturer is stated on the label

F. Number of sheets - the total number of sheets in the carton is stated on the label

G. Class of paper - the class of paper is stated on the label

H. Ream wrapped - each ream of paper is wrapped separately; many cartons of paper are flagged each ream instead of wrapped

IV. Summary and Conclusion

- A. Characteristics of paper handling
- B. Classes of paper
- C. Carton label

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

INTERACTION ITEMS:

1. Why are the basic sizes different for different kinds of paper?
2. What type of paper has replaced onion skin (thins) and carbons for multiple copies?
3. Why is coated paper usually used for quality halftones?
4. Why isn't newsprint used for permanent records?
5. Why is uncoated paper usually used for textbooks and reading books?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Select paper for the following type of print job:
    - A. Letterhead
    - B. Concert program
    - C. School newspaper
    - D. Newsletter
    - E. Brochure
    - F. Business forms
2. Compare the difference between halftone pictures printed on coated, uncoated and newsprint papers.
3. Do a chemical analysis on paper and discuss properties of paper.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

EVALUATION ITEMS:

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 1. A ream of paper is 500 sheets regardless of size.

____ 2. The basic size of bond paper is 8-1/2 x 11.

____ 3. The basic weight of bristol paper varies according to its size.

____ 4. Newsprint is of the bristol family.

____ 5. Ledger paper is heavier than typing paper.

____ 6. Onionskin is heavier than ledger paper.

____ 7. The grain direction is indicated by a line under the size on the label.

____ 8. Coated paper is good paper for textbooks.

____ 9. Index stock is a business paper.

____10. The use of onionskin paper has increased with the popularity of computers.

Answer the following questions on the basis of the information provided on the label pictured below.

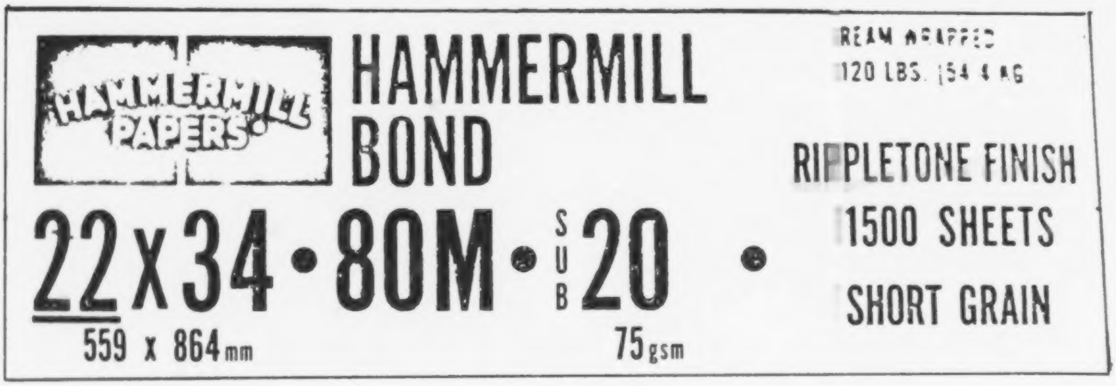
11. What kind of paper is it? ____________________

12. How many reams are in the carton? ________________

13. What is the basic weight of the paper? _______________

14. What does the 559 x 864 mm indicate? _________________

15. What is the size of the paper? ________________________



HAMMERMILL PAPERS

HAMMERMILL BOND

REAM WRAPPED
120 LBS. 54.4 KG

RIPPLETONE FINISH
1500 SHEETS
SHORT GRAIN

22 X 34 • 80M • SUB 20 •
559 x 864mm
75gsm

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

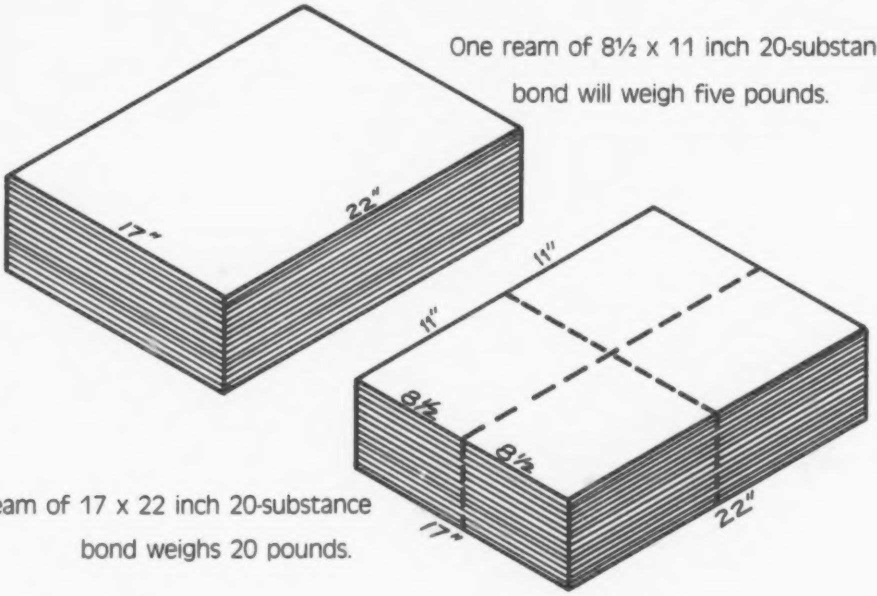
ANSWERS TO EVALUATION ITEMS:

1. T
2. F
3. F
4. F
5. T
6. F
7. T
8. F
9. F
10. F
11. Bond
12. 3
13. 20 pounds
14. Metric measurements of paper
15. 22 x 34

Basic Size/Weights of Common Papers: Ream Weight by Size

Kind	General Uses	Basic Size (Inches)	Some Substance (or Basis Weights) (Pounds)	Other Sizes Commonly Made (Inches)
1. Bond	Letterheads, documents, office forms	17 x 22	9, 13, 16, 20, 24	17 x 28, 19 x 24, 22 x 34, 24 x 38
2. Onionskin	Makeready in pressroom, carbon copies, air mail	17 x 22	7, 8, 9, 10	17 x 26, 17 x 28, 19 x 24, 22 x 34
3. Writing or Flat	Price books, statements, booklets, broadsides	17 x 22	16, 20, 24	17 x 28, 19 x 24, 22 x 34, 24 x 38
4. Safety	Checks, drafts, notes	17 x 22	24	17 x 28, 19 x 24
5. Ledger	Accounting and machine bookkeeping	17 x 22	24, 28, 32, 36	17 x 28, 19 x 24, 22 x 34, 24 x 38
6. Index Bristol	Index cards, folders	25½ x 30½	90, 110, 140, 170	20½ x 24¾, 22½ x 28½
7. Card Bristol	Postcards, tickets	22½ x 28½	94	
8. Offset (Book)	Surface sized for general printing Surface sized book for books and halftones Calendered for halftones Enameled for best (finest) halftones	25 x 38	50, 60, 70 80, 90, 100	17½ x 22½, 19 x 25, 23 x 29, 28 x 42, and multiples
9. Opaque	Highly opaque for circulars with halftones	17 x 22	16, 20, 24, 28, 32	17½ x 22½, 23 x 29, 23 x 35
10. Cover	Covers Enameled for covers with halftones	20 x 26	50, 60, 65, 80	23 x 35, 26 x 40
11. Label	Labels Coated — for varnishing	25 x 38	50, 60, 70	

*For complete listings of papers in sheets and rolls, consult papermakers' catalogs.



One ream of 8½ x 11 inch 20-substance bond will weigh five pounds.

One ream of 17 x 22 inch 20-substance bond weighs 20 pounds.

Inch to Millimeter Conversion Table for Paper Sizes

Millimeters are rounded off to nearest millimeter.

Inches	= mm	Inches	= mm	Inches	= mm	Inches	= mm
6	152	14 1/4	362	22 1/2	572	30 3/4	781
6 1/4	159	14 1/2	368	22 3/4	578	31	787
6 1/2	165	14 3/4	375	23	584	31 1/4	794
6 3/4	171	15	381	23 1/4	591	31 1/2	800
7	178	15 1/4	387	23 1/2	597	31 3/4	806
7 1/4	184	15 1/2	394	23 3/4	603	32	813
7 1/2	191	15 3/4	400	24	610	32 1/4	819
7 3/4	197	16	406	24 1/4	616	32 1/2	826
8	203	16 1/4	413	24 1/2	622	32 3/4	832
8 1/4	210	16 1/2	419	24 3/4	629	33	838
8 1/2	216	16 3/4	425	25	635	33 1/4	845
8 3/4	222	17	432	25 1/4	641	33 1/2	851
9	229	17 1/4	438	25 1/2	648	33 3/4	857
9 1/4	235	17 1/2	445	25 3/4	654	34	864
9 1/2	241	17 3/4	451	26	660	34 1/4	870
9 3/4	248	18	457	26 1/4	667	34 1/2	876
10	254	18 1/4	464	26 1/2	673	34 3/4	883
10 1/4	260	18 1/2	470	26 3/4	679	35	889
10 1/2	267	18 3/4	476	27	686	35 1/4	895
10 3/4	273	19	483	27 1/4	692	35 1/2	902
11	279	19 1/4	489	27 1/2	699	35 3/4	908
11 1/4	286	19 1/2	495	27 3/4	705	36	914
11 1/2	292	19 3/4	502	28	711	36 1/4	921
11 3/4	298	20	508	28 1/4	718	36 1/2	927
12	305	20 1/4	514	28 1/2	724	36 3/4	933
12 1/4	311	20 1/2	521	28 3/4	730	37	940
12 1/2	318	20 3/4	527	29	737	37 1/4	946
12 3/4	324	21	533	29 1/4	743	37 1/2	953
13	330	21 1/4	540	29 1/2	749	37 3/4	959
13 1/4	337	21 1/2	546	29 3/4	756	38	965
13 1/2	343	21 3/4	552	30	762	*	
13 3/4	349	22	559	30 1/4	768		
14	356	22 1/4	565	30 1/2	775		

*To obtain other sizes — multiply inches × 25.4, and round off to nearest whole millimeter.

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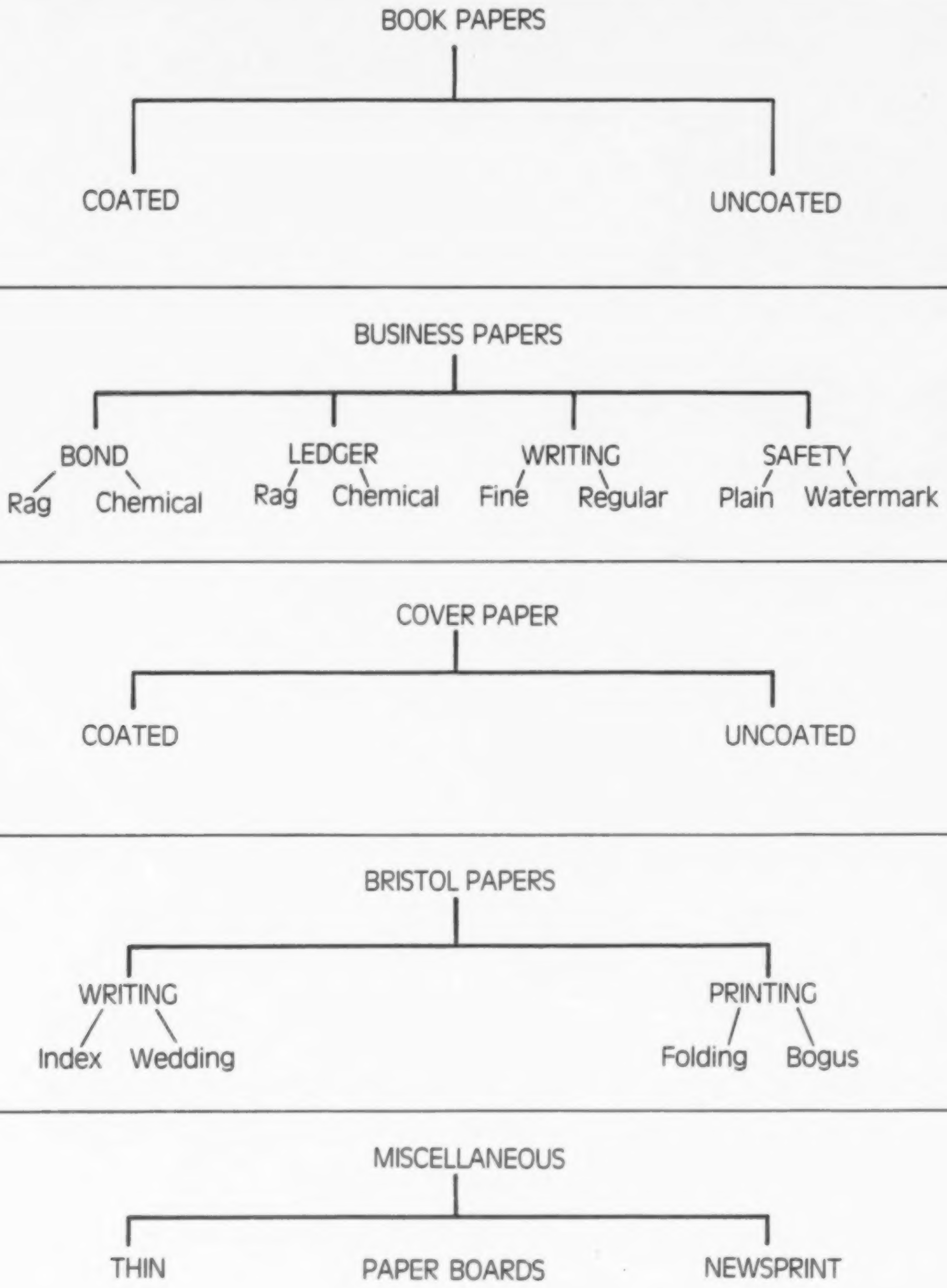
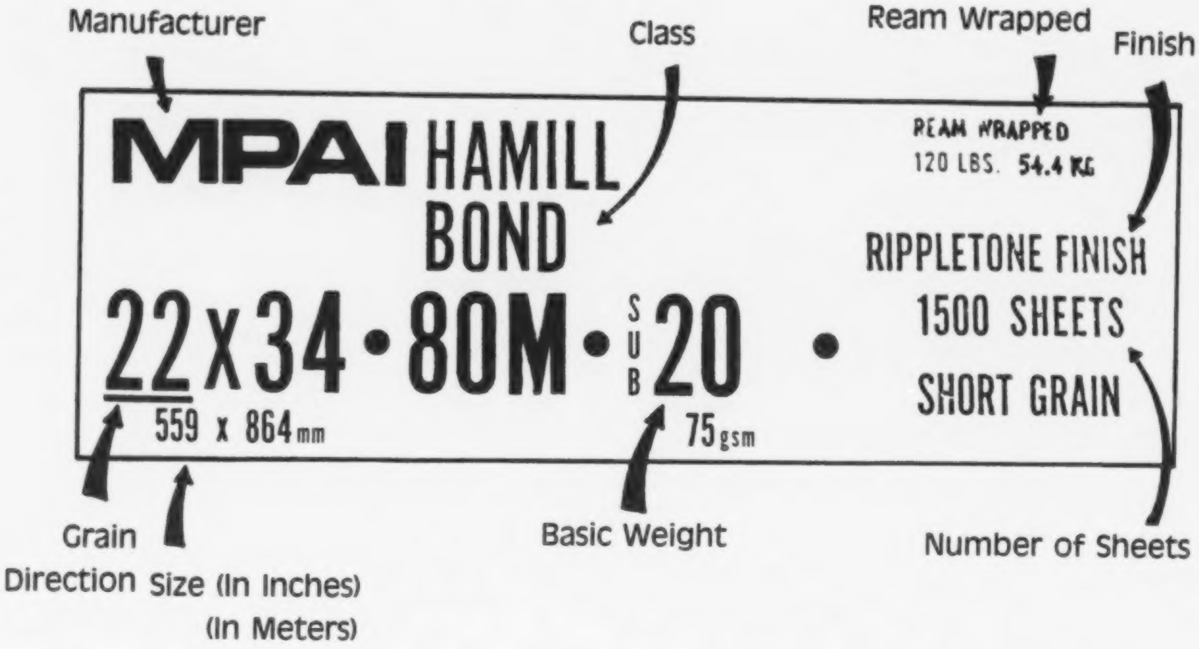
HO 3

Classes of Paper


BOOK PAPERS
COATED
UNCOATED
BUSINESS PAPERS
BOND
Rag
Chemical
LEDGER
Rag
Chemical
WRITING
Fine
Regular
SAFETY
Plain
Watermark
COVER PAPER
COATED
UNCOATED
BRISTOL PAPERS
WRITING
Index
Wedding
PRINTING
Folding
Bogus
MISCELLANEOUS
THIN
PAPER BOARDS
NEWSPRINT

1039

Paper Carton Label


Manufacturer
Class
Ream Wrapped
Finish
MPAI HAMILL BOND
REAM WRAPPED
120 LBS. 54.4 KG
RIPPLETONE FINISH
22 X 34 • 80M • SUB 20 •
1500 SHEETS
SHORT GRAIN
559 x 864 mm
75 gsm
Grain Direction
Size (In Inches) (In Meters)
Basic Weight
Number of Sheets

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

SCOPE OF UNIT:

To successfully produce a quality printed product, the paper must be the right kind, the right condition, the right cut, and the right amount. This emphasizes the need to keep paper in that condition until it is ready for the pressroom and then counted and cut correctly. Because of its weight, safety becomes a major concern when handling paper. Proper handling of all materials is a major factor to consider.

INFORMATION TOPIC: XIII-2 OR DEMONSTRATION:

FIGURING PAPER
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Define the term stock size.
2. Define the term press size.
3. Define the term finish size.
4. Differentiate between a regular cut and a combination cut.
5. Identify true statements related to figuring paper.
6. Figure paper stock for specific jobs.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Determining Amount of Paper Needed
2. HO 2: Combination Cut (Dutch Cut)
3. HO 3: Cutting Slip
4. AS 1: Figuring Paper Stock

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, unit 154, pp. 471-472.

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch. 23, pp. 573-578.

REFERENCES:

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 16, pp. 279-280.

Cogoli, John E. Photo-Offset Fundamentals. Bloomington, IL: McKnight Publishing Company, 1980, ch. 16, pp. 277-278.

INTRODUCTION:

Correctly figuring the amount of paper needed for a particular printing job is of the utmost importance because paper is the most expensive part of the job. A wrong cut or too much waste in the sheet all result in lost profits.

10.12

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII: PAPER HANDLING

OUTLINE: (Key Points)

I. Stock Size - size of the stock prior to cutting to predetermined size

II. Press Size - size the sheet is to be out for printing on the press

   A. Press sheets - number of sheets needed to be cut from the stock size to produce the correct number of printed products (HO 1)

   B. Spoilage - the number of sheets that are estimated to be spoiled during the press operation and post-press operation; usually figured as a percentage of the number of press sheets

III. Finished Size - the size of the final printed product after all press and post-press operations have been completed

IV. Grain Direction - the direction that the grain runs on the sheet; often necessary for post-press operations such as folding or scoring

   A. Regular cut - cutting the most press sheets from the stock size with the grain running in the same direction on all sheets

   B. Combination cut - cutting the most press sheets from the stock size without regard for grain direction; sometimes called dutch cut or irregular cut (HO 2)

V. Watermark paper - paper that has a logotype made in the paper as it is manufactured; the watermark is usually centered on an 8-1/2 x 11 sheet and should be cut to remain in the center

VI. Factors to Consider When Cutting Paper (HO 3)

   A. Type of job

      1. Grain direction

2. NCR paper

3. Watermark

B. Size of stock in inventory

C. Number of press sheets needed

D. Spoilage

1. Number of press runs

2. Post-press operations

E. Best method of cutting stock

1. Regular cut

2. Combination cut (dutch cut)

VII. Summary and Conclusion

A. Stock size

B. Press size

C. Finished size

D. Grain direction

E. Watermark paper

F. Factors to consider when cutting paper

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

INTERACTION ITEMS:

1. Is the grain of the stock important when figuring stock?
2. How should the "watermark" appear on the printed sheet?
3. Why are there many sizes of stock the same weight?
4. Why does the spoilage vary according to the number of press sheets?
5. If grain direction is important, why do we not use the combination cut?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Check letterheads that are watermarked; are they printed correctly? What is the standard size for the letterhead? How is the watermark spaced on a 17 x 22 sheet?
2. What type of job does the grain direction become a paper figuring problem?

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII: PAPER HANDLING

EVALUATION ITEMS:

1. Define the term stock size.

2. Define the term press size.

3. Define the term finish size.

4. What is the difference between regular cut and a combination cut?

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 5. On letterheads the "watermark" should always read correct.

____ 6. The standard size of a letterhead is 8 x 10.

____ 7. Spoilage percentage usually increases on longer runs.

____ 8. Bristol paper to be folded should not use the combination cut.

____ 9. The spoilage should include only spoilage for the press run.

____ 10. 7 sheets of stock 6 x 9 can be cut from stock 17 x 28.

____ 11. 8% spoilage on an order for 2750 sheets is 210.

____ 12. A sheet 9 x 12 should be cut from 25 x 38 stock instead of 23 x 35.

____13. 200 4 x 6 cards cut from 25-1/2 x 30-1/2 index will require 7 sheets.

____14. 5,000 sheets 6 x 9 will require 417 sheets of 25 x 38.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

ANSWERS TO EVALUATION ITEMS:

1. Stock size is the size of the stock prior to cutting to a predetermined size.
2. Press size is the size the sheet is to be cut for printing on the press.
3. Finish size is the size of the final printed product after all press and post-press operations have been completed.
4. Regular cut involves cutting the most press sheets from the stock size with the grain direction running in the same direction on all sheets, while a combination cut is cutting the most press sheets from the stock size regardless of grain direction.
5. T
6. F
7. F
8. T
9. F
10. T
11. F
12. T
13. T
14. F

HO 1

Determining Amount of Paper Needed

When estimating the amount of paper stock for a printing job, you must know the number of finished copies required and the size of the available press or printing form. Compute the number of copies that can be cut from a standard sheet size. An 8½ x 11 inch letterhead would be cut from 17 x 22 inch bond paper. Use the common method of dividing and canceling:

$$\frac{\overset{2}{\cancel{17}} \times \overset{2}{\cancel{22}}}{\cancel{8\frac{1}{2}} \times \cancel{11}} = 4 \text{ PIECES}$$

From each sheet of 17 x 22 inch bond paper, four pieces of 8½ x 11 inch stock can be cut. In this example, the size of the needed pieces divided evenly into the size of the original sheet.

Sometimes it is necessary to try dividing in both directions to determine how the cuts can be made most efficiently. If a booklet, 9 x 12 inches is to be printed from 25 x 38 book paper, the calculations are:

$$\frac{\overset{2+}{\cancel{25}} \times \overset{3+}{\cancel{38}}}{\cancel{9} \times \cancel{12}} = 6 \text{ PIECES}$$

Turn the paper the other way:

$$\frac{\overset{2+}{\cancel{25}} \times \overset{4+}{\cancel{38}}}{\cancel{12} \times \cancel{9}} = 8 \text{ PIECES}$$

It is more economical then, to cut the stock with the 12 inch side along the 25 inch dimension. If grain directions are not a factor, always try both directions to determine which will give you more pieces.

After you have calculated the number of pieces from each sheet, you can figure the total number of sheets required. Divide the number of finished copies required by the number of pieces obtained from each sheet. For example, if 500 letterheads are needed, and you will get four 8½ x 11 inch pieces from a 17 x 22 inch sheet:

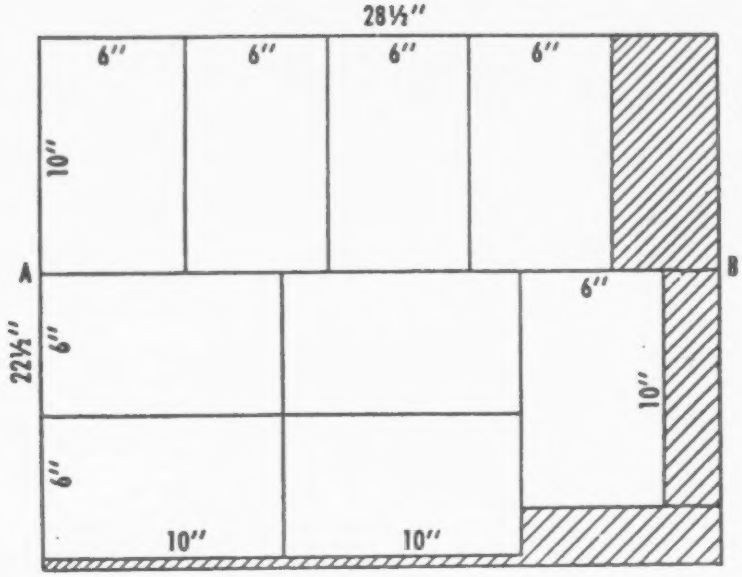
$$\begin{array}{r} 125 \\ 4\overline{)500} \\ \underline{4} \\ 100 \\ \underline{8} \\ 20 \\ 20 \end{array}$$

Thus, 125 sheets of 17 x 22 inch paper are needed for 500 letterheads at 8½ x 11 inches.

It is best to allow some extra paper for spoilage. Spoilage occurs when setting guides, adjusting ink, and feeding the press. Each additional operation, such as folding, stapling, and trimming, increases the number of extra sheets needed. A good allowance for 500 letterheads is usually about 10 percent. Thus for 500 good copies, about 550 pieces of stock will be required. As the number of copies required increases, the percentage of spoilage decreases. For 10,000 copies, three or four percent is all the spoilage necessary.

HO 2

Combination Cut (Dutch Cut)


28½″
6″
6″
6″
6″
10″
A
B
22½″
6″
6″
6″
10″
10″
10″

HO 3

Cutting Slip

JOB NO: 896

CUTTING SLIP

DATE: 10/15

Total Sheets From:
Stock: 500
Location: E5

Number Out Of
One Sheet 4

Total Sheets:
Press Size: 2000
For Press: Chief 15

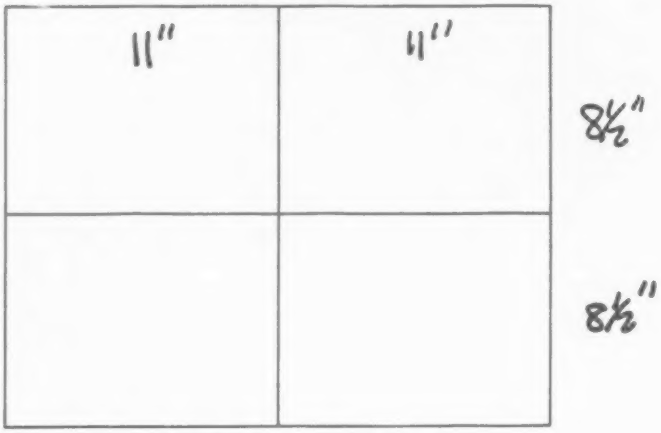
CUT 500 SHEETS ______ COLOR White FINISH WOVE BRAND Peter Piper

KIND Bond SIZE 17 × 22 SUBSTANCE 20 TO 8½ × 11

SPECIAL INSTRUCTIONS: Felt Side Up.

Figured by: Matthew Whig Cut by: Betty Sharp Date: ______

DIAGRAM



FIGURES

17 × 22 ✓ yes
8½ × 11
2 × 2 = 4/sheet

17 × 22 ✗ NO!
11 × 8½
1 × 2 = 2/SHEET

ASSIGNMENT SHEET 1 - FIGURING PAPER STOCK

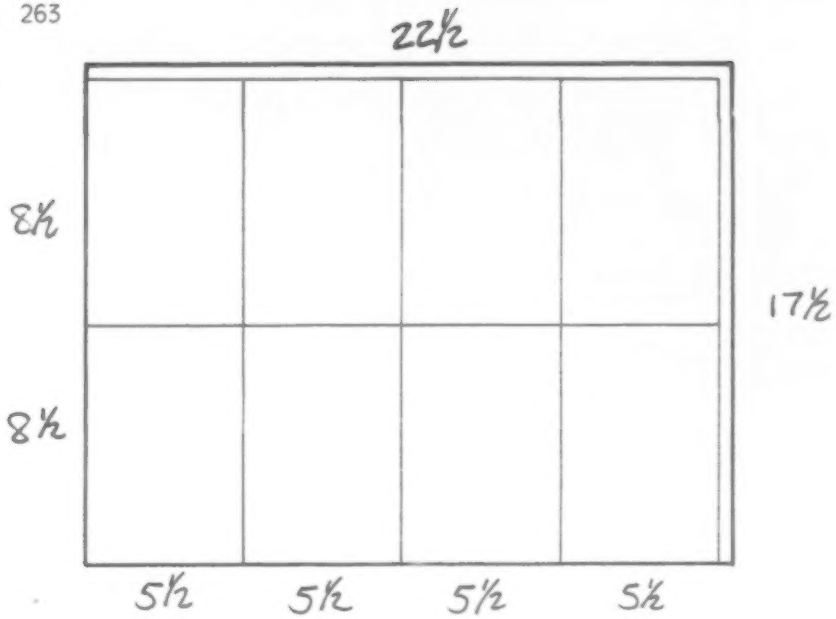
Directions: This assignment sheet will help you review and check your understanding of the information presented in this lesson. Complete the following exercises as directed.

A. Figure paper stock for the following jobs:

1. How many sheets of 17 x 22 inch stock are needed for 1,000 sheets of 8½ x 11 inch stock? No spoilage is needed.
2. How many sheets of 25 x 38 inch stock are needed for 2,500 9 x 12 inch sheets? Figure ten percent spoilage.
3. How many sheets of 25½ x 30½ inch index stock are needed to cut 50,000 3 x 5 inch index cards? No printing is required so no spoilage is needed.
4. How many sheets of 5½ x 8½ inch stock can be cut from a 17½ x 22½ inch sheet?
5. How many sheets of 17 x 28 inch ledger stock are needed for 5,000 sheets of 8½ x 14 inch. Running two colors, allow for 8 percent spoilage.
6. How many sheets of 8½ x 11 inch stock can be cut from 25 x 38 inch stock?
7. How many sheets of 17½ x 22½ inch stock are needed for 1,000 sheets of 4 x 6 inch stock? No spoilage.
8. How many sheets of 25½ x 30½ inch index stock are needed for 1,500 cards, 6 x 10 inch? Stock is to be run 10 x 12 inch (two-up) with 10 percent spoilage.
9. How many sheets of 20 x 26 inch cover stock are needed for 6 x 9 inch loose leaf book stock? 1,000 covers to be printed; 1,000 backs cut but not printed; spoilage on printed stock only.
10. Make a cutting diagram of Problem Four.

ANSWERS TO ASSIGNMENT SHEET 1 - FIGURING PAPER STOCK

1. 250
2. 344 (250 spoilage)
3. 10,000
4. 8
5. 1,350 (400 spoilage)
6. 8
7. 72
8. 138
9. 263
10.


22½
8½
8½
17½
5½
5½
5½
5½

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII: PAPER HANDLING

SCOPE OF UNIT:

To successfully produce a quality printed product, the paper must be the right kind, the right condition, the right cut, and the right amount. This emphasizes the need to keep paper in that condition until it is ready for the pressroom and then counted and cut correctly. Because of its weight, safety becomes a major concern when handling paper. Proper handling of all materials is a major factor to consider.

INFORMATION TOPIC: XIII-3 OR DEMONSTRATION:

PAPER STORAGE
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify true statements concerning receiving and storing paper.
2. Identify key points in paper handling.
3. Identify points relating to safe paper handling.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Pallet/Skid

INFORMATIONAL ASSIGNMENT: (Student)

Spence, Wm. P. and David G. Vequist. *Graphic Reproduction*. Peoria, IL: Charles A. Bennett, 1980, ch. 25, p. 665.

REFERENCES:

Bureau, William H. *What the Printer Should Know About Paper*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1982, ch. 6, pp. 153-168.

INTRODUCTION:

Paper is the basic ingredient in the printing industry. Correct storage, record keeping and handling are necessary to have paper arrive at the press, ready to run. Safety, when handling paper, is a primary concern.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

OUTLINE: (Key Points)

I. Receiving and Storage of Paper - incoming paper received at the dock for transportation to storage area

  A. Unloading areas - the unloading dock should be the height of the bed of the truck to facilitate movement of forklift; doors should be double width for easy maneuverability

  B. Checking invoices - invoices should be checked against the original order and the packing sheet; any incorrect data should be noted and so indicated prior to signature

  C. Condition of paper - paper should be checked for damaged corners, broken cartons or unsealed skids or rolls, and notations made on the packing sheet

  D. Location - location of the storage facility should be convenient to docks

II. Paper Handling - equipment used to handle paper depends upon the size and volume of the paper used

  A. Pallet - a wooden platform containing a top and bottom to which bulk paper is strapped for moving (HO 1)

  B. Skid - a wooden or metal platform, containing only a top, to which bulk paper is strapped for moving (HO 1)

  C. Roll - a roll of paper of varying sizes used on a web press

  D. Forklift - a mechanical lift used to move pallets and skids of paper from one location to another; a special adapter is used to move rolls of paper

  E. Dolly - a two-wheeled truck used to move cartons of paper in the storage area

III. Safety

A. Equipment - marked areas on the floor to indicate routes for forklifts

B. Lights - flashing lights used to alert personnel of moving equipment; bells are also used to alert personnel

C. Clothing - proper clothing when working with paper is necessary

    1. Steel-capped shoes - steel-capped shoes are necessary to prevent broken bones

    2. Hard hat - a hard hat is necessary to protect the head from paper stacked in the storage area

    3. Gloves - gloves are necessary when working with skids, rolls or pallets of paper

D. Lifting techniques

    1. Lift with the legs keeping the back straight; injury to the back is the most common paper handling injury.

    2. Work as a team and lift together.

E. Stacking techniques

    1. Stack paper on shelf with label toward aisle.

    2. Stack stock evenly on dolly.

F. Campaigns - constant alertness to safety practices are necessary to prevent accidents in the work place

    1. Posters - posters serve as constant reminders to personnel about importance of safety

    2. Meetings - meetings get everyone involved with safety

    3. Inspections - OSHA conducts safety inspections to enforce their regulations; company personnel should also

    4. Incentives - a variety of safety incentives enhance a safe atmosphere when working

IV. Summary and Conclusion

A. Receiving and storage of paper

B. Paper handling

C. Safety

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

INTERACTION ITEMS:

1. What is done when paper arrives in poor condition?
2. What is done when paper has to be back ordered?
3. What effect does poor storage facilities have on paper?
4. How should a carton of paper be lifted manually?
5. When not done properly, what type of injury might result?
6. What happens when paper cartons are dropped? To the paper? To the individual?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Draw a storage facility layout.
    a. Mark areas for various types of paper.
    b. Indicate correct temperature and relative humidity.
    c. Draw aisles large enough for forklifts.
    d. Discuss lighting for main aisles and for feeder aisles.

LESSON PLAN: __3__

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT __XIII__: PAPER HANDLING

EVALUATION ITEMS:

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 1. The most common paper handling injury is to the back.

____ 2. Running shoes made of leather provide comfort and adequate protection when working with paper.

____ 3. A pallet is supported by steel or wooden legs for transportation.

____ 4. Safety campaigns remind employees to practice good work habits.

____ 5. All paper should be opened to allow proper ventilation upon arrival in the storage area.

____ 6. Storage lighting should be the same as pressroom lighting.

____ 7. Invoices require the signature of the receiving station.

____ 8. The unloading dock should be lower than the height of the truck bed so that the boxes of paper can be thrown down onto it.

____ 9. Incorrect invoices should be noted prior to signing them.

____10. Forklifts cannot be used for rolls of paper.

1060

LESSON PLAN: 3

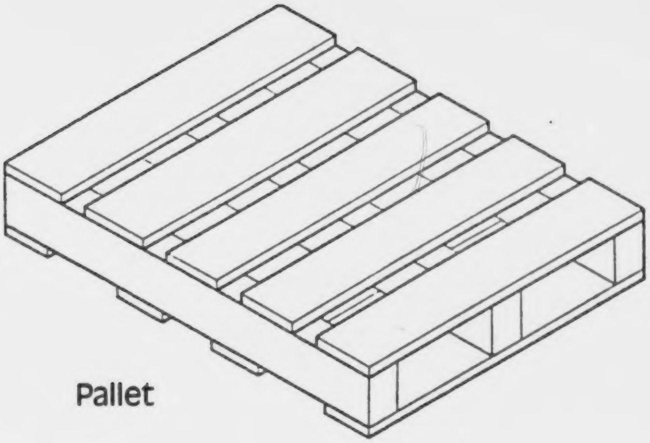
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

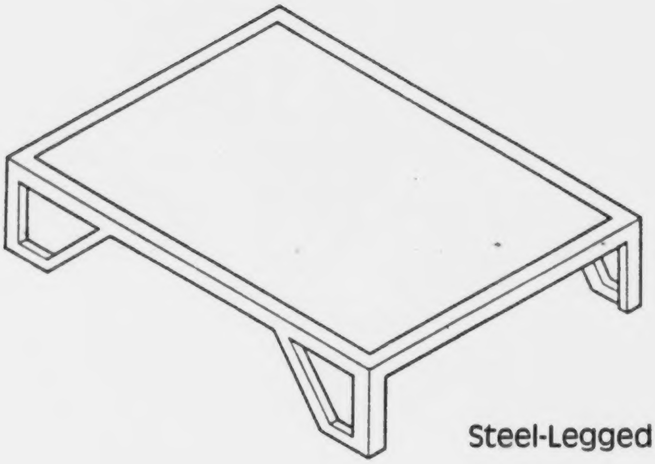
ANSWERS TO EVALUATION ITEMS:

1. T
2. F
3. F
4. T
5. F
6. F
7. T
8. F
9. T
10. F

Pallet/Skid



Pallet



Steel-Legged Skid

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

SCOPE OF UNIT:

To successfully produce a quality printed product, the paper must be the right kind, the right condition, the right cut, and the right amount. This emphasizes the need to keep paper in that condition until it is ready for the pressroom and then counted and cut correctly. Because of its weight, safety becomes a major concern when handling paper. Proper handling of all materials is a major factor to consider.

INFORMATION TOPIC: XIII-4 OR DEMONSTRATION:

CONDITIONING PAPER
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify points in proper handling of paper.
2. Identify points in temperature conditioning of paper.
3. Determine length of time needed to condition paper for the pressroom.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Temperature Conditioning of Paper
2. HO 2: Counting Paper
3. AS 1: Calculating Time Required to Condition Paper

INFORMATIONAL ASSIGNMENT: (Student)

Spence, Wm. P. and David G. Vequist. *Graphic Reproduction*. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

Bureau, William H. *What the Printer Should Know About Paper*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1982, ch. 7, pp. 169-178.

INTRODUCTION:

Moving stock from the warehouse to the pressroom just prior to press time will result in increased spoilage on the press and a poorly printed product. Because of the variety of storage facilities in the industry, conditioning paper to the pressroom is necessary. This lesson concentrates on counting the paper and the amount of time needed to condition paper.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

OUTLINE: (Key Points)

I. Conditioning Paper for Press

   A. Volume of paper - length x width x height

   B. Conditioning time - amount of time needed to bring temperature of paper in storage to temperature of pressroom

   C. Relative humidity - the amount of moisture in the air in storage and the amount of moisture in the air in the pressroom

II. Handling Paper (HO 1)

   A. Reducing waste - proper handling of paper reduces the amount of paper that is torn or ruined prior to press

      1. Corners - handling cartons of paper in a proper manner that prevents them from being dropped on the corners; this prevents the corners from bending

      2. Tearing wrappers - tearing wrappers allows moisture to enter the skid or carton and increases press spoilage

      3. Stacking stock - stacking stock flat on the floor prevents sheets from becoming curled; rolls of paper should be placed on their ends, not on their sides, to prevent flat spots from developing

      4. Clean floor space - keep storage area floor clean because the weight of paper will create indentions in paper if objects are left under cartons

   B. Partial packages - packages of paper that have been opened and partly used create storage problems

      1. Reseal packages - by resealing packages, moisture is kept out of the package and insects are kept from eating paper

      2. Carrying large sheets - the proper method for carrying large sheets of paper a short distance is to bend the sheets in thirds before lifting

3. Counting - small quantities of paper can be counted by hand; large amounts by reams or automatic counting devices (HO 2)

III. Summary and Conclusion

   A. Conditioning paper for press

   B. Handling paper

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

INTERACTION ITEMS:

1. Why is a clean storage area needed to reduce spoilage?
2. What happens when wrappers on cartons are torn or gouged?
3. Why does rolling rolls of paper increase spoilage?
4. Why are cartons not stacked on end?
5. Why are large sheets rolled in thirds to carry?
6. Why reseal packages after they have been opened?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Compare a ream of typing paper that has been left unsealed for a long period of time with a ream that has just been unwrapped.
2. Calculate the amount of printed copies that could have been printed from the spoilage on a "roll" of paper.
3. Calculate how many printed copies could have been printed from spoilage in a carton of paper.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

EVALUATION ITEMS:

Select the correct answer from what you have learned in this lesson and from HO 1 Temperature Conditioning of Paper; place the correct number in the blank provided.

____ 1. Paper that is taken to the pressroom from a cold storage area will:

- a. Have wavy edges
- b. Not affect edges
- c. Have tight edges
- d. Split the edges

____ 2. What is the volume of a skid of paper 24" x 36" x 5' high?

- a. 35
- b. 18
- c. 30
- d. 24

____ 3. How many hours of conditioning are necessary to bring paper to pressroom temperature if the skid is 17" x 22" x 72" at a temperature difference of 30 degrees?

- a. 28 hours
- b. 35 hours
- c. 27 hours
- d. 48 hours

____ 4. How many hours of conditioning time is necessary for a skid 22" x 34" x 5' at 25 degrees difference?

- a. 22 hours
- b. 28 hours
- c. 32 hours
- d. 34 hours

____ 5. How many hours of conditioning time is necessary for a roll 4' in diameter and 17" wide stored at a difference of 40 degrees?

a. 35 hours
b. 54 hours
c. 38 hours
d. 48 hours

____ 6. Ideally the temperature of the storage area should be ______ degrees.

a. 65 degrees
b. 70 degrees
c. 85 degrees
d. 50 degrees

____ 7. Torn or bent corners on paper creates what press problem?

a. Inking
b. Dampening
c. Feeding
d. Delivery

____ 8. Marking each ream of stock in a carton is called:

a. Tabbing
b. Labeling
c. Flagging
d. Branding

____ 9. Resealing carton keeps the __________ out.

a. Dust
b. Moisture
c. Bugs
d. Light

____10. Large sheets should be rolled in __________ when hand carried.

a. Thirds
b. Half
c. Fourths
d. None of these

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

ANSWERS TO EVALUATION ITEMS:

1. a
2. c
3. b
4. c
5. d
6. b
7. c
8. c
9. b
10. a

Temperature Conditioning of Paper

Improperly conditioned paper can be a nightmare to the press operator. Feeding problems and poor registration often result from paper that has come directly from a hot or cold storage area with no allowance for proper conditioning time in the pressroom. Modern plants include paper storage areas in which temperature and relative humidity are controlled.

Paper should never be stored in direct contact with concrete or damp floors. Moisture absorption from damp floors will produce distorted and damaged paper. Platforms or racks that elevate the paper from floors should be used. Paper should not be stored next to radiators or other heated objects, by cold walls, or in areas subject to sudden and drastic changes in temperature.

Rolls should be stored on their ends, not on their sides. Storing rolls on their sides causes them to become out of round. Storing them on their ends in too many tiers can flare the ends of the bottom-tiered rolls.

If cold paper is brought into the pressroom and unwrapped, the unprotected edges will quickly absorb moisture. The edges of the paper will become wavy. Cold rolls exposed to warm pressroom air will absorb moisture and develop distortions on their faces and softness at their ends. Moisture pickup in the outer wraps of coated paper may even cause blistering during heatset drying.

The reverse occurs when paper that is warmer than the pressroom is unwrapped. The higher temperature of the paper warms up the surrounding air and lowers its relative humidity. The paper's edges lose moisture to the drier air and shrink. These tight edges resulting from warm paper are more easily removed and cause less trouble than wavy edges caused by cold paper but, they can be avoided.

The length of time required to temperature-condition paper depends upon the size or volume of the skid, roll, or carton. To find the approximate temperature of the paper, insert a sword hygrometer or paper hygroscope into the paper. Read the temperature after it has become constant, between the wrapper and roll end (It is not possible to insert the blade between roll layers without damaging the paper). The chart on this page shows the time required for various volumes and temperature differentials between the paper and the pressroom.

General Temperature Conditioning Chart

Temperature Difference in Degrees	10	15	20	25	30	40	50	60
6 cubic ft.	5	9	12	15	18	25	35	54
12 cubic ft.	8	14	18	22	27	38	51	78
24 cubic ft.	11	16	23	28	35	48	67	100
48 cubic ft.	14	19	26	32	38	54	75	109
96 cubic ft.	15	20	27	34	41	57	79	115

Hours paper should stand, unopened, in order to come into balance with pressroom temperature

To determine the volume of a skid or carton of paper:

$$\text{Volume (ft.}^3) = \frac{\text{Length X Width X Height (inches)}}{1{,}728\ (12'' \times 12'' \times 12'')}$$

To determine the volume of a roll:

$$\text{Volume (ft.}^3) = \frac{\text{Diameter X Diameter X Width (inches)}}{2{,}200}$$

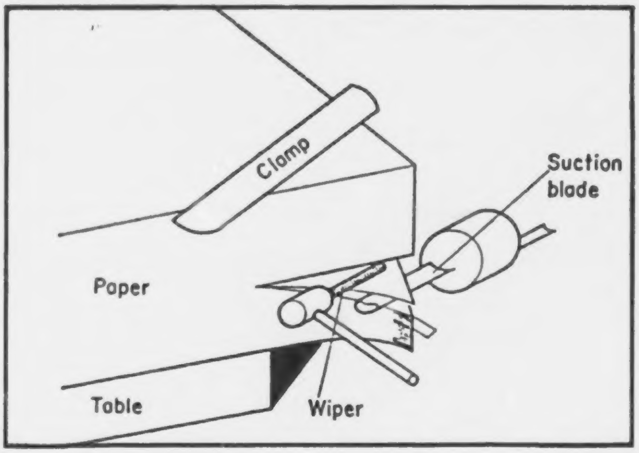
For more information, see GATF Technical Services Report 9, "*Changes in Temperature and RH Directly Affect Paper.*"

HO 2

Counting Paper

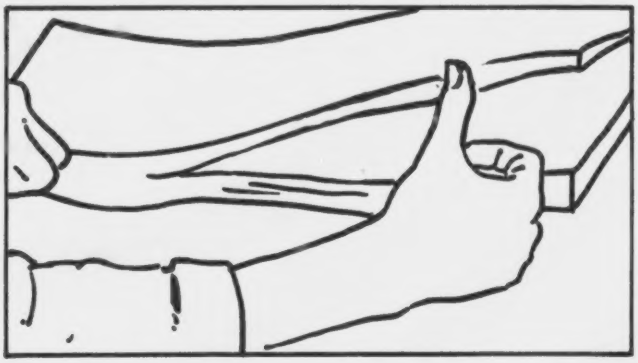
By Machine

1. Corner of the paper stack is inserted into the counting head so paper covers the hole in the suction blade.
2. Lowest corner is pulled down by suction as wiper arm moves above blade and tucks the corner downward as the machine records one unit.
3. Process continues as each paper corner contacts suction blade.



By Hand

1. Palm of hand up
2. One inch of paper at edge away from counter
3. Roll paper over your hand allowing parallel edge to flare
4. Count in groups of five
5. Thumb and first finger to guard groups already counted



Hand counting requires clean hands and a quick eye.

ASSIGNMENT SHEET 1 - CALCULATING TIME REQUIRED TO CONDITION PAPER

Directions: Use HO 1, Temperature Conditioning of Paper, to calculate the number of hours the paper stock needs to set in the pressroom prior to being run through the press.

Skids

1. 35" x 45" x 6' at a temperature change of 30 degrees
2. 25" x 38" x 5' at a temperature change of 40 degrees
3. 26" x 40" x 4' at a temperature change of 25 degrees
4. 38" x 50" x 6' at a temperature change of 10 degrees

Rolls

5. 4' diameter x 32" wide at a temperature of 20 degrees
6. 2½' diameter x 14" wide at a temperature of 30 degrees
7. 48" diameter x 22" wide at a temperature of 10 degrees
8. 5' diameter x 11" wide at a temperature of 60 degrees

ANSWERS TO ASSIGNMENT SHEET 1 - CALCULATING TIME REQUIRED TO CONDITION PAPER

1. 65.6 cubic feet - 41 hours
2. 32.9 cubic feet - 54 hours
3. 28.8 cubic feet - 32 hours
4. 79.1 cubic feet - 15 hours
5. 33.5 cubic feet - 26 hours
6. 5.7 cubic feet - 18 hours
7. 23 cubic feet - 11 hours
8. 18 cubic feet - 100 hours

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII: PAPER HANDLING

SCOPE OF UNIT:

To successfully produce a quality printed product, the paper must be the right kind, the right condition, the right cut, and the right amount. This emphasizes the need to keep paper in that condition until it is ready for the pressroom and then counted and cut correctly. Because of its weight, safety becomes a major concern when handling paper. Proper handling of all materials is a major factor to consider.

INFORMATION TOPIC: XIII-5 OR DEMONSTRATION:

INVENTORY
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify information kept on an inventory system.
2. State the factor that determines the size of the inventory.
3. Define the first in, first out theory.
4. State reasons for using the first in, first out theory.
5. Identify the use of a stock cutting form.
6. State advantages of computerized inventory.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. TM 1: Perpetual Inventory Form
2. TM 2: Stock Requisition
3. TM 3: Individual Stock Form
4. TM 4: Material Requisition
5. TM 5: Stock Requisition Cutting Order
6. TM 6: Computer Inventory Print-Out

INFORMATIONAL ASSIGNMENT: (Student)

Spence, Wm. P. and David G. Vequist. *Graphic Reproduction*. Peoria, IL: Charles A. Bennett, 1980.

REFERENCES:

National Association of Printers and Lithographers. *Paper Manager's Handbook*. 780 Palisade Ave., Teaneck, NJ 07666, 1983.

INTRODUCTION:

Paper inventory is a time consuming job that requires planning and record maintenance. Keeping the proper stock on hand, and in sufficient quantities, is the primary function of inventory. Determining what stock to return to inventory, what sizes of cut stock to keep, and how long stock should be kept on the shelves are decisions for inventory personnel. Computer systems have made the job much easier and provide data faster.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

OUTLINE: (Key Points)

I. Need For an Inventory System - based on availability; stock must be on the floor when the press is ready to print job

II. Information Kept on an Inventory System

A. Location of stock - location of stock should be by classes of paper; most often used classes and amounts of paper used should be in the most convenient location

B. Supplier - the supplier of the paper, batch number and delivery date are necessary to identify any problems that might arise; also use the oldest paper first (first in, first out theory)

C. Paper specifications - the basic weight of the paper and the size of the stock

D. Cost - cost is an optional requirement but an aid in the annual inventory; cost is kept in administrative offices

E. Total sheets in stock - a perpetual inventory should be kept to provide information about the total sheets of any particular size in stock

F. Room available - the amount of floor space that is not used when the inventory is at full capacity; size of inventory is determined by this

III. Forms

A. Perpetual inventory form - a form that provides an immediate update on stock as paper is moved out of the storage area (TM 1)

B. Stock requisition - a form for ordering stock from the storage area to be delivered to a certain location (TM 2)

C. Individual stock form - a special form for each kind of paper in storage (TM 3)

D. Material requisition - another form used to order paper from the storage area; often in multiples allowing copies to be sent to administrative offices, inventory, and production manager (TM 4)

E. Stock requisition/cutting order (TM 5)

  1. Combination form is used to order stock and provides cutting instructions to the paper cutter operator.

  2. The stock cutting form is often used as an inventory form because stock is taken from storage to be cut, changing the number of sheets in inventory.

IV. Computerized Storage - most or all of the above information is stored in the computer and is immediately available (TM 6)

A. Information - more information can be stored easily and faster than conventional inventory systems

B. Access - information can be accessed faster for changes, update of costs, and amount of specific stock from several locations in the plant

V. Summary and Conclusion

A. Need for an inventory system

B. Information kept on an inventory system

C. Forms

D. Computerized storage

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII: PAPER HANDLING

INTERACTION ITEMS:

1. Why maintain an inventory?
2. What kind of information is kept on inventory?
3. What determines the reorder level?
4. Where is the inventory kept?
5. What factors determine the size of the inventory?
6. How is the inventory accessed?
7. What materials, besides paper, are inventoried? Why?
8. Who pays for stock damaged in shipment?
9. Why should the first in, first out theory be used?
10. Why should unusable paper not be returned to inventory?
11. What is done with obsolete stock?
12. What advantages does a computer have?
13. What additional information can be used for inventory?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. List the information needed on an inventory card and design a card for inventory.
2. Using card from above, keep inventory for school year.
3. Make decisions at end of year on what to reorder; obsolete stock; and scrap paper.
4. After one semester using manual inventory, convert inventory to computer system.
5. Enlarge your inventory to contain more than paper stock.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

EVALUATION ITEMS:

1. List three kinds of information that are kept on an inventory system.

   a.

   b.

   c.

2. What determines the size of the inventory?

3. What is the first in, first out theory?

4. List two reasons for using the first in, first out theory.

   a.

   b.

5. Why is the stock cutting form often used as an inventory form?

6. What are two advantages of computerized inventory?

   a.

   b.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIII : PAPER HANDLING

ANSWERS TO EVALUATION ITEMS:

1. The student may list any three of the following:
   a. Location
   b. Supplier
   c. Paper specifications
   d. Cost
   e. Sheets in stock
2. Area of storage
3. Use paper that has been in storage the longest first.
4. The student may list any two of the following:
   a. Prevents discoloration of stock
   b. Stock doesn't become brittle
   c. Stock doesn't become damaged
5. Because stock is taken from storage to be cut, changing the number of sheets in inventory.
6. The student may list any two of the following:
   a. More information stored
   b. Faster retrieval
   c. Faster entry

Perpetual Inventory Form

Warehouse Location # ____________ **PERPETUAL INVENTORY**

Description ______________________________ Basis ________ Size ________ Grain ________

Color ____________________ Suppliers (1) ____________________ (2) ____________________

				BALANCE
			(opening)	
RECEIPTS		USAGE		▨
P.O. #	QUANTITY	JOB #	QUANTITY	▨

1499

- 1082

1083

TM 1

Stock Requisition

Date ________

STOCK REQUISITION No. 000

The following stock is to be used on:

JOB ORDER NO. ________ CUSTOMER ________________ DESCRIPTION ________________________

PAPER			BUY OUT	WAREHOUSE LOCATION	SHEET SIZE or ROLL WIDTH	WEIGHT (ROLLS)	NO. SHEETS	AMOUNT RETURNED TO INVENTORY
NAME	SUB.	COLOR						

Paper Bought From ____________________ P.O. # ________________

DELIVER TO ☐ CUTTER ON __________ AND PRESS # __________ ON __________

1501

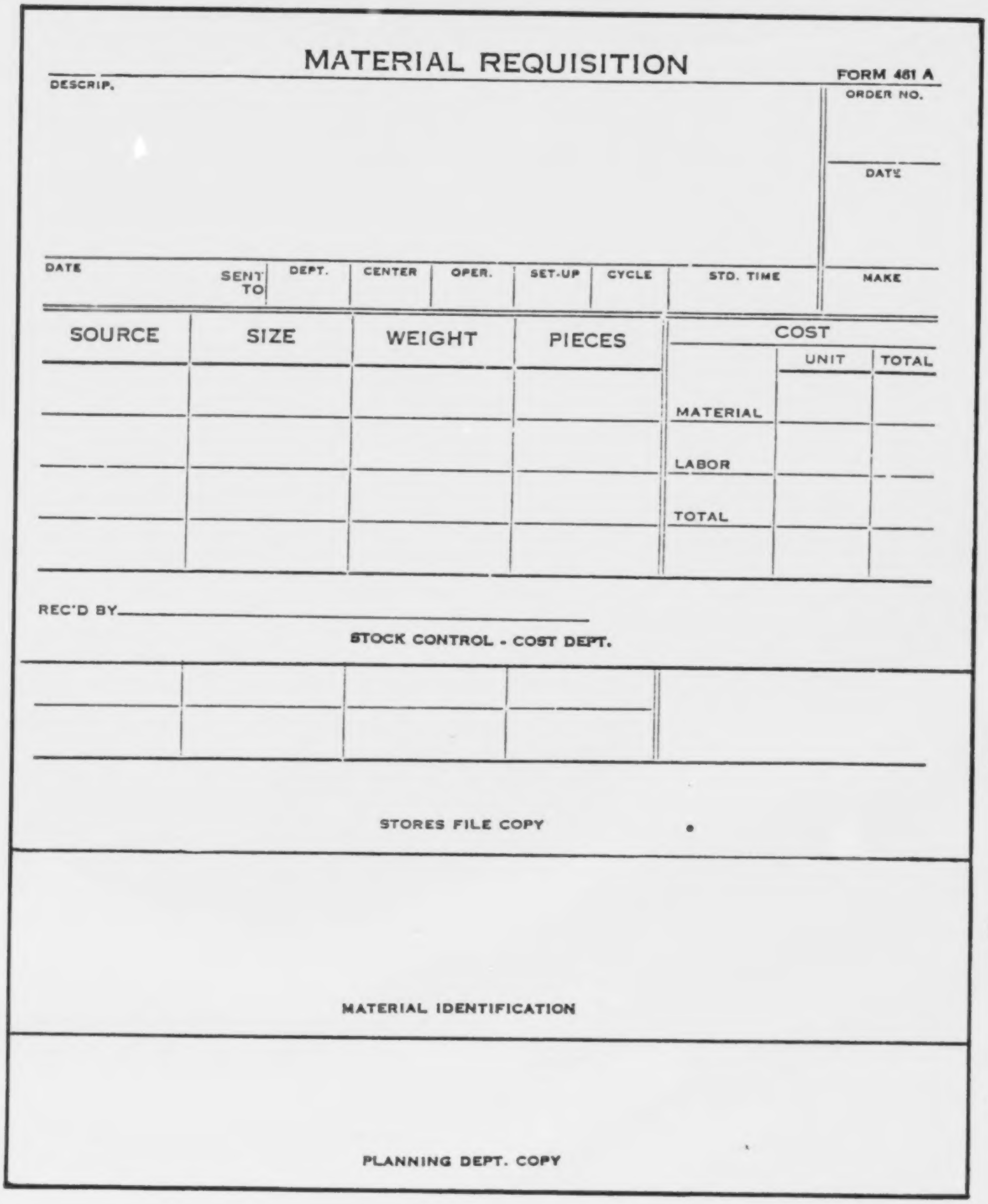
TM 2

Individual Stock Form

ITEM____________________________________

VENDOR	BRAND	SPECS.	SIZE	QUANTITY ORDERED	DATE ORDERED	UNIT PRICE

Material Requisition



MATERIAL REQUISITION

FORM 461 A

DESCRIP.

ORDER NO.

DATE

DATE	SENT TO	DEPT.	CENTER	OPER.	SET-UP	CYCLE	STD. TIME	MAKE

SOURCE	SIZE	WEIGHT	PIECES	COST		
					UNIT	TOTAL
				MATERIAL		
				LABOR		
				TOTAL		

REC'D BY______________________________

STOCK CONTROL - COST DEPT.

PINK

STORES FILE COPY

BLUE

MATERIAL IDENTIFICATION

GREEN

PLANNING DEPT. COPY

YELLOW

Stock Requisition Cutting Order

STOCK REQUISITION CUTTING ORDER

QUANTITY	Cust. Order No.	Salesman		Letterpress ☐ Offset ☐	Stock Out ☐	JOB NO.

For

Address

Deliver to ○

DESCRIPTION

	Width	Depth			
Body Pgs.	Size	×	Run	on	Note:
Cover Self	Size	×	Run	on	
Print Pgs. 1 2 3 4	Size	×	Run	on	

Buy Out	In Stock	PAPER STOCK Sheet Size		Kind of Paper	No. Sheets	CUTTING INSTRUCTIONS Cut to	Pcs. Out	Total	Deliver to
		×	—			×			
		×	—			×			
		×	—			×			
		×	—			×			
		×	—			×			

Ordered from Date by | Ordered from Date by | Ordered from Date by

Special Cutting Instructions | Combination Cut | Square | des ○

INSTRUCTIONS

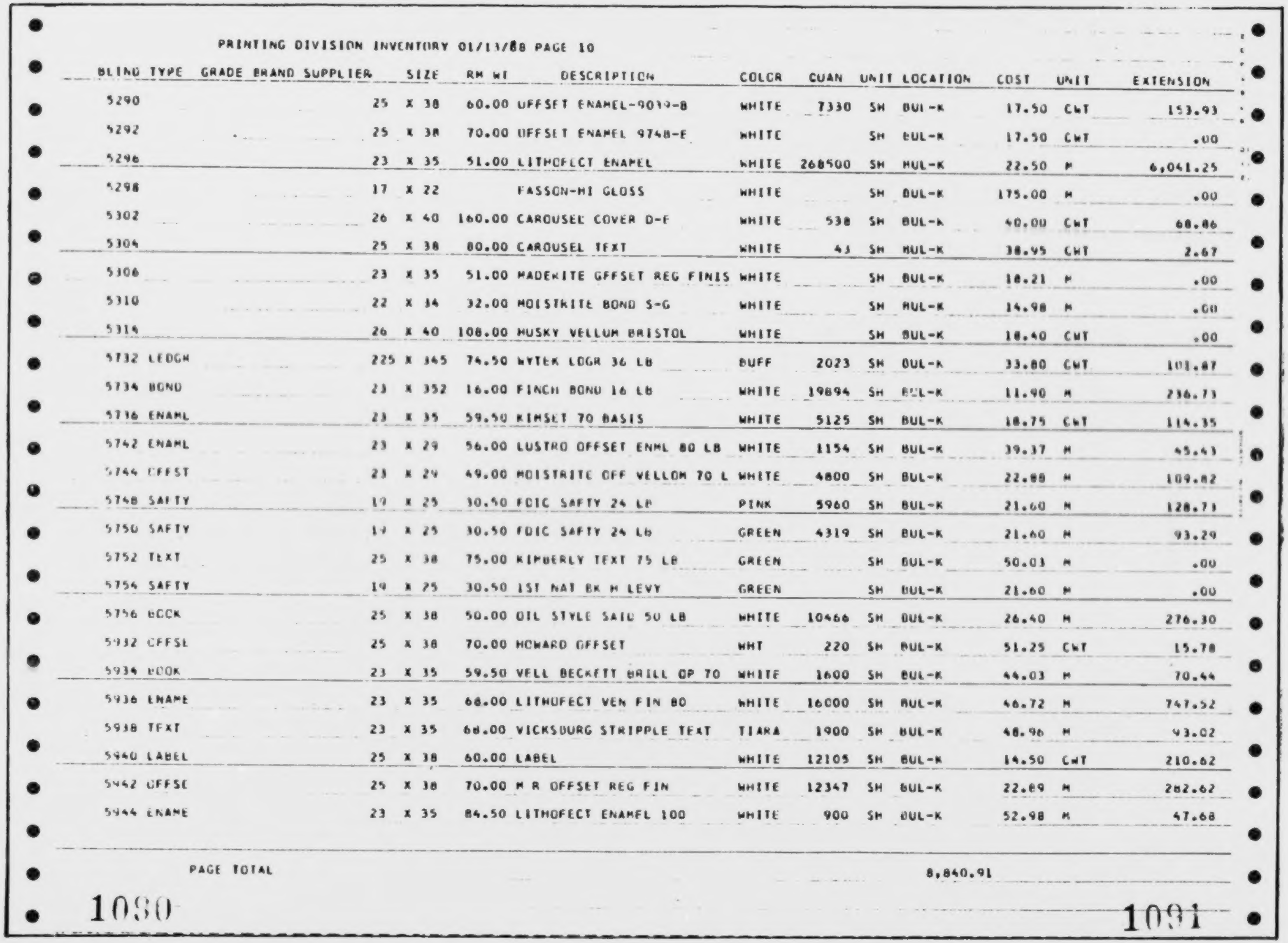
1507

TM 5

1088

1089

Computer Inventory Print-Out



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            PRINTING DIVISION INVENTORY 01/13/88 PAGE 10
   BLIND TYPE  GRADE BRAND SUPPLIER    SIZE    RM WT      DESCRIPTION               COLOR   QUAN  UNIT LOCATION    COST  UNIT      EXTENSION
    5290                              25  X 38   60.00 OFFSET ENAMEL-9039-B        WHITE    7330  SH  BUL-K      17.50  CWT          153.93
    5292                              25  X 38   70.00 OFFSET ENAMEL 9748-F        WHITE          SH  BUL-K      17.50  CWT             .00
    5296                              23  X 35   51.00 LITHOFECT ENAMEL            WHITE  268500  SH  BUL-K      22.50  M          6,041.25
    5298                              17  X 22         FASSON-HI GLOSS             WHITE          SH  BUL-K     175.00  M               .00
    5302                              26  X 40  160.00 CAROUSEL COVER D-F          WHITE     538  SH  BUL-K      40.00  CWT           68.86
    5304                              25  X 38   80.00 CAROUSEL TEXT               WHITE      43  SH  BUL-K      38.95  CWT            2.67
    5306                              23  X 35   51.00 MADEKITE OFFSET REG FINIS   WHITE          SH  BUL-K      18.21  M               .00
    5310                              22  X 34   32.00 MOISTRITE BOND S-G          WHITE          SH  BUL-K      14.98  M               .00
    5314                              26  X 40  108.00 HUSKY VELLUM BRISTOL        WHITE          SH  BUL-K      18.40  CWT             .00
    5732 LEDGR                       225  X 345  74.50 WYTEK LDGR 36 LB            BUFF     2023  SH  BUL-K      33.80  CWT          101.87
    5734 BOND                         23  X 352  16.00 FINCH BOND 16 LB            WHITE   19894  SH  BUL-K      11.90  M            236.73
    5736 ENAML                        23  X 35   59.50 KIMSET 70 BASIS             WHITE    5125  SH  BUL-K      18.75  CWT          114.35
    5742 ENAML                        23  X 29   56.00 LUSTRO OFFSET ENML 80 LB    WHITE    1154  SH  BUL-K      39.37  M             45.43
    5744 OFFST                        23  X 29   49.00 MOISTRITE OFF VELLOM 70 L   WHITE    4800  SH  BUL-K      22.88  M            109.82
    5748 SAFTY                        19  X 25   30.50 FDIC SAFTY 24 LB            PINK     5960  SH  BUL-K      21.60  M            128.73
    5750 SAFTY                        19  X 25   30.50 FDIC SAFTY 24 LB            GREEN    4319  SH  BUL-K      21.60  M             93.29
    5752 TEXT                         25  X 38   75.00 KIMBERLY TEXT 75 LB         GREEN          SH  BUL-K      50.03  M               .00
    5754 SAFTY                        19  X 25   30.50 1ST NAT BK M LEVY           GREEN          SH  BUL-K      21.60  M               .00
    5756 BOOK                         25  X 38   50.00 OIL STYLE SAID 50 LB        WHITE   10466  SH  BUL-K      26.40  M            276.30
    5932 OFFSE                        25  X 38   70.00 HOWARD OFFSET               WHT       220  SH  BUL-K      51.25  CWT           15.78
    5934 BOOK                         23  X 35   59.50 VELL BECKETT BRILL OP 70    WHITE    1600  SH  BUL-K      44.03  M             70.44
    5936 ENAME                        23  X 35   68.00 LITHOFECT VEN FIN 80        WHITE   16000  SH  BUL-K      46.72  M            747.52
    5938 TEXT                         23  X 35   68.00 VICKSBURG STRIPPLE TEXT     TIARA    1900  SH  BUL-K      48.96  M             93.02
    5940 LABEL                        25  X 38   60.00 LABEL                       WHITE   12105  SH  BUL-K      14.50  CWT          210.62
    5942 OFFSE                        25  X 38   70.00 M R OFFSET REG FIN          WHITE   12347  SH  BUL-K      22.89  M            282.62
    5944 ENAME                        23  X 35   84.50 LITHOFECT ENAMEL 100        WHITE     900  SH  BUL-K      52.98  M             47.68

          PAGE TOTAL                                                               8,840.91
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1080

1091

1509

TM 6

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIV : PACKAGING AND PREPARING FOR MAILING

SCOPE OF UNIT:

The printed product is of little value until it reaches the customer. The final operation of the printed job is to prepare it for delivery. The job may be a single package to be delivered across town or several skids shipped across the country.

The importance of properly preparing the finished job for shipping cannot be understated. Time and materials have been expended to produce a quality printed product. It should arrive at its destination in top quality condition. Keeping adequate records on outgoing shipments is important, not only for costing, but because of the condition of the product upon arrival at its destination.

INFORMATION TOPIC: XIV-1 OR DEMONSTRATION:

PACKAGING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify key points related to wrapping.
2. Identify key points related to banding.
3. Identify key points related to tying.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Wrappers/Banders
2. HO 2: Shrink Wrappers
3. HO 3: Mechanical Tying Machines

INFORMATIONAL ASSIGNMENT: (Student)

Martin, A. G. *Finishing Process in Printing*. Great Britain: W & J Mackey Limited, Chathan, ch. 9, pp. 118-121.

REFERENCES:

Walker, John R. *Graphic Arts Fundamentals*. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 10, pp. 190-194.

Dennis, Ervin A. *Lithographic Technology*. Indianapolis, IN: Bobbs-Merrill, 1980, sec. 12, pp. 396-397.

INTRODUCTION:

Packaging is a post-bindery operation usually done in the bindery area. The type of packaging required is often determined by the distance the job is to travel. Another factor that influences the packing process is the size of the order. The quality of the packaging reflects the company's prestige.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIV : PACKAGING AND PREPARING FOR MAILING

OUTLINE: (Key Points)

I. Wrapping (HO 1)

   A. Mailing - printed material for mailing must conform to postal regulations; material should be packaged so that if dropped on the corner it will not damage printing paper; postal regulations have requirements for weight and size and must be wrapped with reinforced tape

   B. Delivery - printed material to be wrapped for delivery should be wrapped securely to protect the material from the elements; delivery should indicate that the package is one of the total number of packages

   C. Paper - kraft paper wrap is sufficient wrapping for small packages that do not have contact with the elements; a sample sheet is often placed on top of the package for convenience

   D. Plastic - plastic wrap protects the printed material from the elements and is cheaper and more convenient to work with

      1. Shrink-wrap - a heating process that shrinks the plastic around the material to present a professional looking job (HO 2)

      2. Skids - printed material that is shipped by skids requires a plastic wrap around the material to protect it from the elements, the operation of the forklift, and the waiting on docks

   E. Boxing - boxing of printed material assists in storing of material after delivery as well as handling during the delivery process

II. Banding

   A. Paper - paper bands are used as a counting process and a convenience for both the customer and the printer; paper banding requires an additional means of wrapping for handling

   B. Plastic - plastic banding is most often used to band boxes for protection and ease of handling

C. Metal - metal banding is often used for large boxes and skids to prevent slippage and ensure the wrapping remains in place

III. Tying (HO 3)

A. Off-line - tying done off-line is used to package a certain number of printed pieces into a more convenient working unit

B. On-line - on-line tying is the final operation from the press, usually the web; material is counted, separated and finally tied and made ready for delivery

IV. Summary and Conclusion

A. Wrapping

B. Banding

C. Tying

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIV : PACKAGING AND PREPARING FOR MAILING

INTERACTION ITEMS:

1. What advantages does plastic wrap have over paper?
2. Why should a packaged product look neat for delivery?
3. What problems are there when boxing printed material?
4. Why does the need to know how material is to be delivered become important when packaging a product?
5. What problems occur with shrink-wrapping?
6. Why is the temperature of the tunnel critical?
7. What types of materials are used for bands?
8. How can banding damage the product?
9. Why are products tied instead of wrapped?
10. What advantage does boxing have for shipping?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Using kraft paper and tape, wrap single reams of paper for storage. Fold and crease corners accurately to present a neat package. If the package were to be mailed, what changes would be necessary?
2. Using plastic wrap, wrap a ream of paper. What kind of problems are encountered? Is it easier than paper wrap? Why isn't tape needed? How will it withstand handling if mailed?
3. Drop a plastic wrapped package and a paper wrapped package from the same height and compare the damage. Were they dropped flat or on a corner? What damage could result from dropping the package on a corner?
4. Social envelopes are frequently banded. Invitations and announcements are also often banded. Check a box of stationery for bands.

5. Small quantities of printed products are often paper-banded instead of rubber-banded. Place a paper and tape or paper and glue band around a product and compare neatness with that of a rubber band.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIV : PACKAGING AND PREPARING FOR MAILING

EVALUATION ITEMS:

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 1. Many forms are ream wrapped.

____ 2. Banding is primarily done in the newspaper and magazine industry.

____ 3. A hood on a tying machine is for large size bundles.

____ 4. Kraft wrapping paper protects the printed product from moisture.

____ 5. Shrink-wrappers keep moisture out.

____ 6. Heat is used to keep the wrapping paper dry.

____ 7. Odd size packages require specially made boxes.

____ 8. All packaging is done by hand.

____ 9. Counting markers may be required prior to tying because of high press speeds.

____10. Careless handling of wrapped printing is the major cause of damage.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

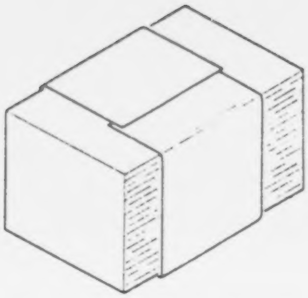
UNIT XIV : PACKAGING AND PREPARING FOR MAILING

ANSWERS TO EVALUATION ITEMS:

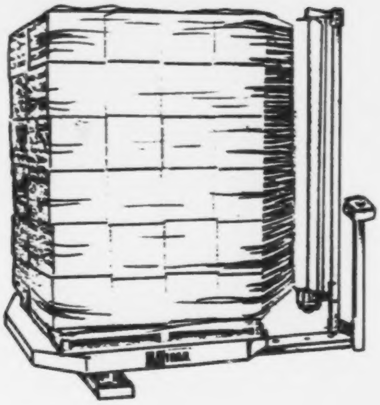
1. T
2. T
3. F
4. F
5. T
6. F
7. T
8. F
9. T
10. T

HO 1

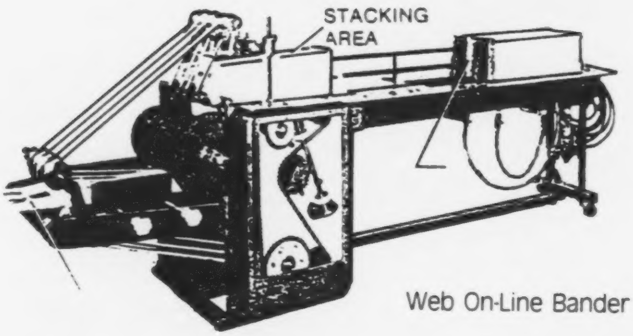
Wrappers/Banders



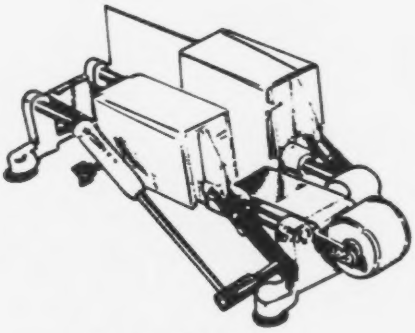
Paper Wrapper



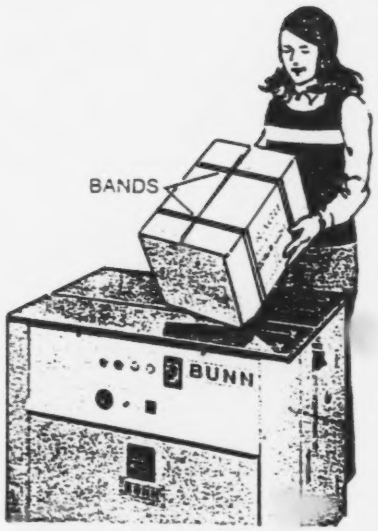
Skid Wrapper


STACKING
AREA

Web On-Line Bander



Box Bander

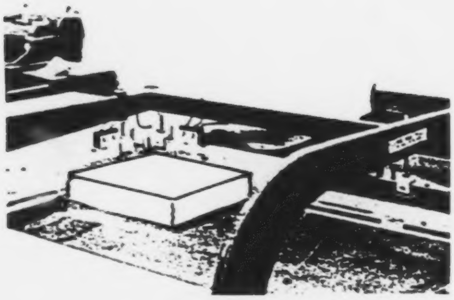


Box Bands

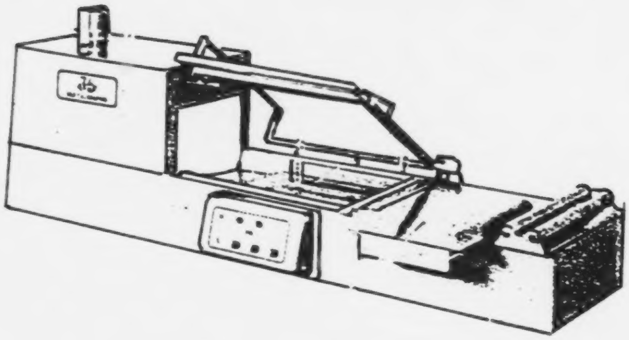
1100

HO 2

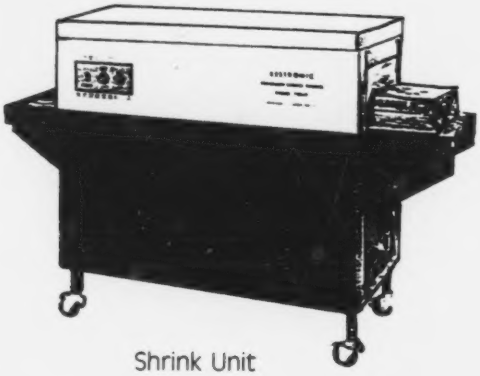
Shrink Wrappers



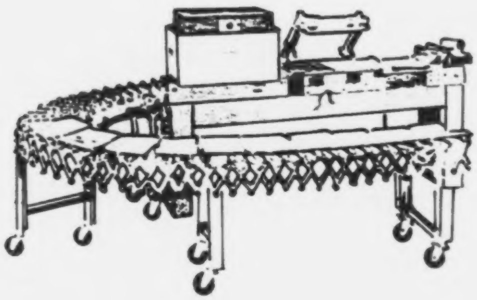
Sealing Job in Plastic



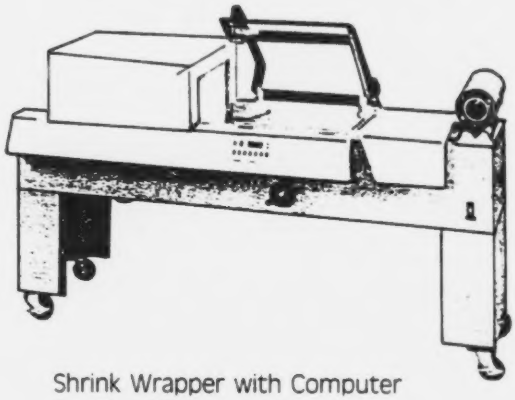
Sealing Unit



Shrink Unit



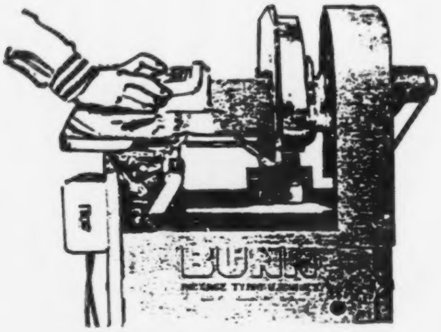
Shrink Wrapper with Conveyor



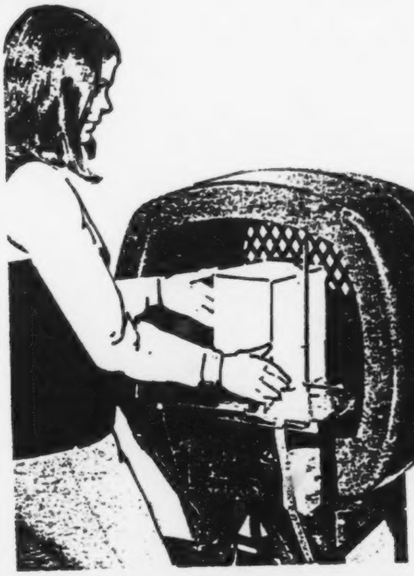
Shrink Wrapper with Computer for Five Different Jobs

HO 3

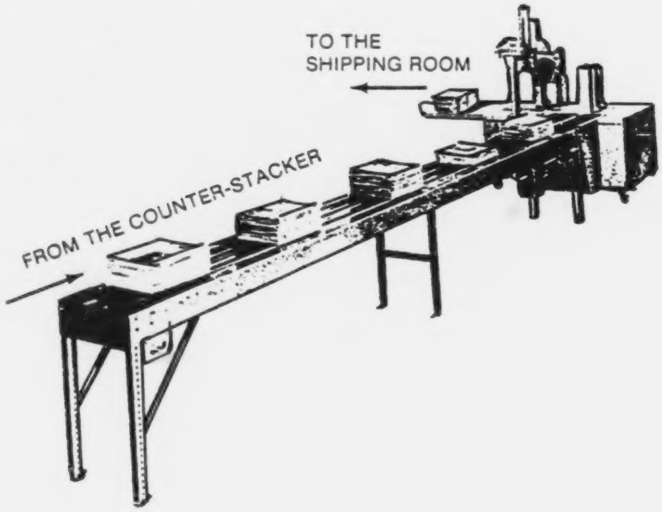
Mechanical Tying Machines



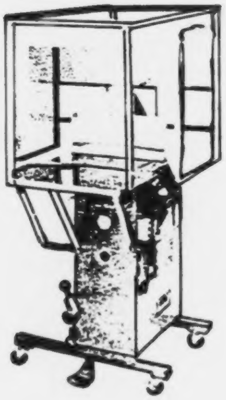
Tying Machine



Tying Machine with Safety Hood


TO THE
SHIPPING ROOM
FROM THE COUNTER-STACKER

Web On-Line Tying Machine



Heavy Duty Tying Machine

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIV : PACKAGING AND PREPARING FOR MAILING

SCOPE OF UNIT:

The printed product is of little value until it reaches the customer. The final operation of the printed job is to prepare it for delivery. The job may be a single package to be delivered across town or several skids shipped across the country.

The importance of properly preparing the finished job for shipping cannot be understated. Time and materials have been expended to produce a quality printed product. It should arrive at its destination in top quality condition. Keeping adequate records on outgoing shipments is important, not only for costing, but because of the condition of the product upon arrival at its destination.

INFORMATION TOPIC: XIV-2 OR DEMONSTRATION:

INK JET PRINTING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify parts of the ink jet printing system.

2. Identify functions of parts of the ink jet printing system.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Ink Jet Printing System

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A.and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 17, unit 149, pp. 458-461.

REFERENCES:

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 10, pp. 190-194.

INTRODUCTION:

One of the newest and fastest methods of printing is "made to order" for the packaging and labeling industry. Ink jet printing, based on the negative and positive charge theory, adapts itself to the packaging industry because there is no contact between form and substrate. The advent of the faster methods of capturing keystrokes also makes it ideal for the labeling and mailing business. Addresses can be stored and updated on computers and printed by ink jet printing systems for faster labeling.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIV : PACKAGING AND PREPARING FOR MAILING

OUTLINE: (Key Points)

I. Ink Jet Printing (HO 1)

  A. Substrate - material to be printed on

  B. Ink supply - storage system for ink

  C. Drop generator - reservoir for ink about to be charged and sprayed

  D. Charge electrode - area where ink passes through to receive electrical charge

  E. Character input source - original source for copy, usually a word processor or computer

  F. Deflection plates - high voltage area that deflects drops for position and substrate

  G. Crystal - vibrates to send drops of ink out of the drop generator evenly

  H. Return orifice - also called gutter where unused ink returns to the ink supply

  I. Electronic source - changes characters into electrical information to charge released drops

  J. Deflection plate power source - source of charge for deflection plates

II. Substrates

  A. Paper - most common substrate used for ink jet printing

  B. Irregular objects - because only dots of ink strike the substrate, most shapes are printable

  C. Edible substrates - because only the sterile ink dots strike the substrates, health conditions are not a factor

III. Uses

  A. Direct mailing - labels and addresses on magazines can be produced at speeds up to 300 per minute

B. Computer applications - with increased memory in computer, speed and versatility can be increased

C. Halftones - increased technology will produce pictures in full color.

D. Speed - when fully developed, speed should be many times faster than current processes

E. Quality - the quality of the character does not produce the straight-edged letter other processes do; small dots of ink are sprayed on top of each other and overlap, producing the desired letter

IV. Summary and Conclusion

A. Ink jet printing

B. Substrates

C. Uses

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIV : PACKAGING AND PREPARING FOR MAILING

INTERACTION ITEMS:

1. What applications are there for the ink jet process?
2. How do the ink drops know where the image area is?
3. What happens to ink drops that are not charged?
4. How has the computer aided the ink jet process?
5. How does ink jet printing work with halftone pictures?
6. How does the speed of the process compare to the typewriter?
7. What types of substrates is the ink jet process adapted for?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Prepare a bulletin board display of ink jet printing.
2. Look at mailing labels with magnifiers to see ink jet dots. How good is the quality of the letter?

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIV : PACKAGING AND PREPARING FOR MAILING

EVALUATION ITEMS:

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 1. Ink jet printing uses the heat transfer process.

____ 2. Characters may be stored on a magnetic card for printing.

____ 3. "No contact" means the ink does not touch the substrate.

____ 4. Ink that is not used is recycled.

____ 5. A complete line can be printed at one time.

____ 6. Halftones for ink jet printing have a higher resolution.

____ 7. A flat substrate is necessary for ink jet printing.

____ 8. The crystal forces the ink drop through a nozzle.

____ 9. The quality of the process is similar to a typewriter.

____10. Deflection plates help form the image.

Identify the numbered parts of the pictured ink jet system.

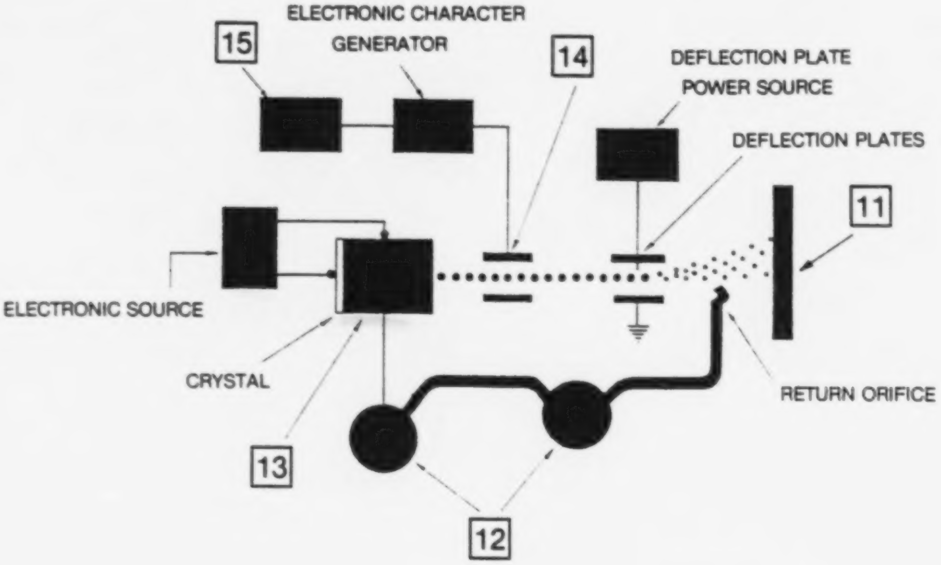
11.__________________________

12.__________________________

13.__________________________

14.__________________________

15.__________________________



ELECTRONIC CHARACTER GENERATOR
15
14
DEFLECTION PLATE POWER SOURCE
DEFLECTION PLATES
11
ELECTRONIC SOURCE
CRYSTAL
13
RETURN ORIFICE
12

1109

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIV : PACKAGING AND PREPARING FOR MAILING

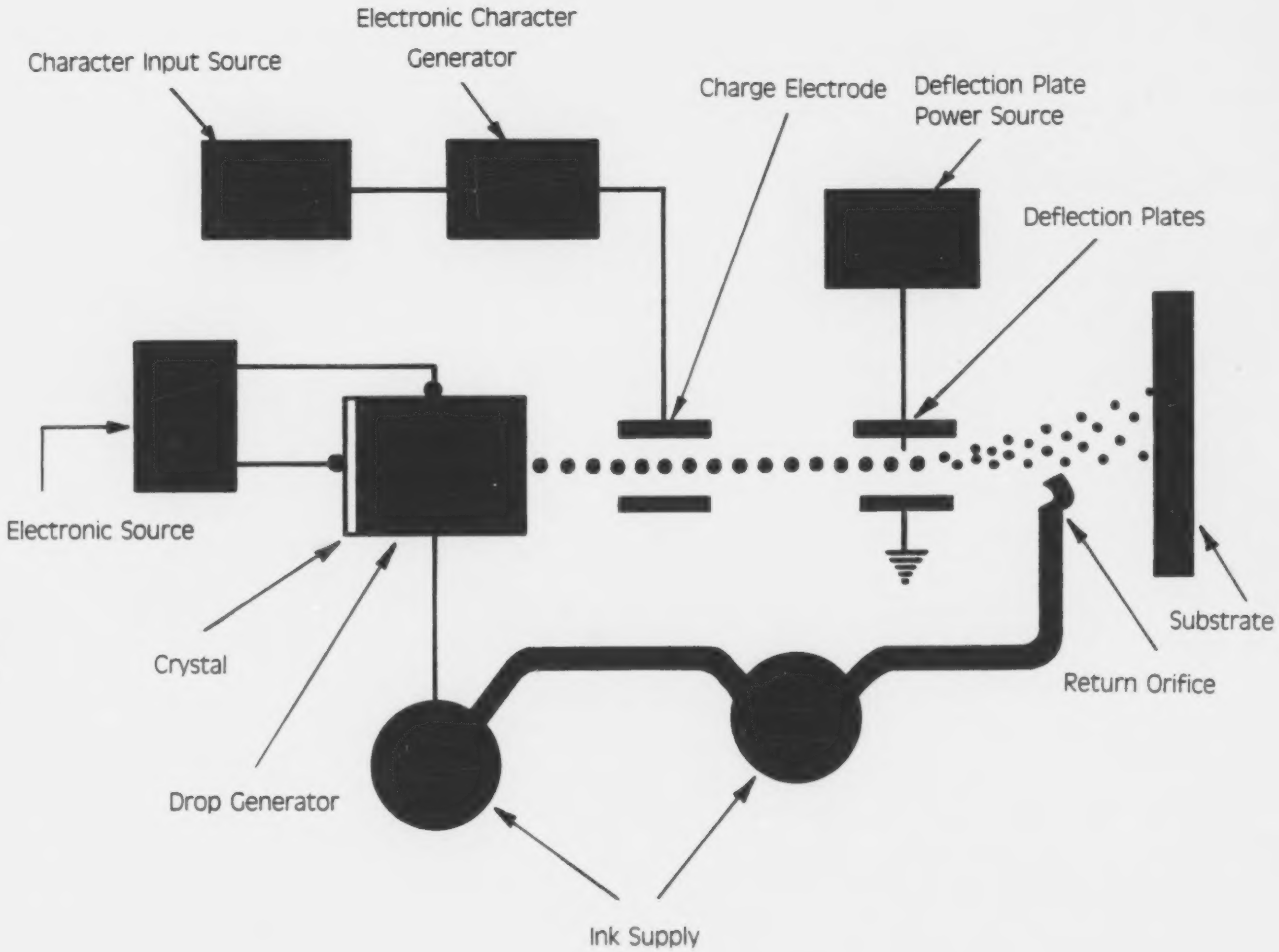
ANSWERS TO EVALUATION ITEMS:

1. F
2. T
3. F
4. T
5. T
6. F
7. F
8. T
9. T
10. T
11. Substrate
12. Ink supply
13. Drop generator
14. Charge electrode
15. Character input source

1110

HO 1

Ink Jet Printing System


Electronic Character Generator
Character Input Source
Charge Electrode
Deflection Plate Power Source
Deflection Plates
Electronic Source
Crystal
Drop Generator
Substrate
Return Orifice
Ink Supply

1111

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIV : PACKAGING AND PREPARING FOR MAILING

SCOPE OF UNIT:

The printed product is of little value until it reaches the customer. The final operation of the printed job is to prepare it for delivery. The job may be a single package to be delivered across town or several skids shipped across the country.

The importance of properly preparing the finished job for shipping cannot be understated. Time and materials have been expended to produce a quality printed product. It should arrive at its destination in top quality condition. Keeping adequate records on outgoing shipments is important, not only for costing, but because of the condition of the product upon arrival at its destination.

INFORMATION TOPIC: XIV-3 OR DEMONSTRATION:

DELIVERY
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. List three advantages of presorting mail.
2. State the minimum size and thickness for mailer cards.
3. List three types of information that should be included on a delivery slip.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Bulk Mailings
2. HO 2: Delivery Receipt
3. HO 3: Packing Slip

INFORMATIONAL ASSIGNMENT: (Student)

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980.

Dennis, Ervin A. Lithographic Technology. Indianapolis, IN: Bobbs-Merrill, 1980, sec. 12, pp. 397-401.

Martin, A. G. Finishing Process in Printing. Great Britain: W & J Mackey Limited, Chathan, ch. 9, pp. 118-121.

REFERENCES:

Dennis, Ervin A. Lithographic Technology. Indianapolis, IN: Bobbs-Merrill, 1980, sec. 12, pp. 397-401.

Martin, A. G. Finishing Process in Printing. Great Britain: W & J Mackey Limited, Chathan, ch. 9, pp. 118-121.

INTRODUCTION:

Getting the printed job to the customer is the final responsibility of the printer. Finding the fastest, safest, and most economical way to deliver the product is the shipping area's responsibility. Knowledge of postal and trucking information is needed to best deliver the product. Record keeping is, perhaps, the most demanding aspect. Records protect the company and provide necessary information concerning delivery dates and location.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIV : PACKAGING AND PREPARING FOR MAILING

OUTLINE: (Key Points)

I. Mailing Printed Material

   A. Express package - overnight service, seven days a week, to assure delivery prior to a deadline

   B. Postal regulations - postal regulations change periodically; contact should be made with post office for current regulations

   C. Size - minimum size for mailer card is 3-1/2 x 5; rectangular in shape; minimum thickness of .007

   D. Mail class - newspapers and periodicals are sent second class mail with permit; third class mail includes circulars, books, catalogs and other printed matter; parcels weighing over 35 pounds must be sent fourth class

II. Sorting by Zip Code

   A. Advantages

      1. Cheaper postage

      2. Faster delivery

      3. Less chance of lost pieces

      4. Less chance of damaged pieces

   B. Sorting

      1. Put all pieces in zip code order.

      2. Sort out all 5-digit zip codes or single zip code cities.*

      3. Sort first 3-digit zip codes.**

      4. Sort all pieces in zip code order for a given state.

      5. Sort all mixed states.***

* Any mailing under 1000 pieces will be difficult to sort for the 5-digit.

** OPTIONAL - If mailing is over 1000, can be sorted for 3-digit, same city first.

*** Less than 10 pieces to any state or all combined may be bundled together.

C. Must follow requirements to qualify for discount rates (HO 1)

1. 200 or more identical pieces with no personalizing marks (exact count)

2. Permit number stamped or printed on each piece

3. Envelopes sealed; fliers must not be stapled (tape or pressure-sensitive labels are acceptable)

4. Bundled (all pieces facing same way)

    a. Minimum - 10 pieces, no more than four inches thick

    b. Should be rubber-banded both ways

    c. Colored stickers in lower left corner of top piece to denote where that bundle is going

        (1) D-(red)--5-digit sort

        (2) 3-(green)--3-digit sort

        (3) C-(yellow)--optional 3-digit, same city sort

        (4) S-(orange)--state sort

        (5) Mixed states get no sticker; attach a piece of paper (same size as mail piece) and write "mixed states" and rubber-band to bundle

5. Bundles must be sacked and labeled as to destination

    a. All 5-digit zips to the same city (i.e. Kansas City has between 40-50 zip codes; if mailing has bundles to 14 separate zips in the K.C. area, they can all be sacked together; list how many pieces go to each zip code. ex. - 20 pieces 64117)

b. All 3-digit bundles in one sack, unless mailing is large enough to separate into each 3-digit section that the post office uses (i.e. 640, 653, etc.) AGAIN, UNLESS YOUR MAILING IS OVER 1000 PIECES, IT IS DIFFICULT TO ATTAIN THIS.

c. All state bundles in one sack

d. If several bundles are going to a state other than Missouri, sack them separately (i.e.- 50 pieces to Kansas, 40 pieces to Iowa; these can also be included in mixed states sack)

e. All mixed states in one sack

f. Local pieces need to be sorted separately and put into a tray or box; do not need to be banded or stickered

6. Sacks and appropriate forms must be taken to the post office issuing permit.

III. Delivery records

A. Postage - use of postage permit or postage meter to monitor amount of postage used

B. Delivery forms - a printed form to indicate what was delivered, when it was delivered, to whom, how many packages and location of delivery; signature should be required; duplicate copies should be made to enable recipient to retain copy, original to return to sender (HO 2)

C. Packing slip - a slip to include number of pieces in delivery; includes sender and recipient, but not cost (HO 3)

IV. Summary and Conclusion

A. Mailing printed material

B. Sorting by zip code

C. Delivery records

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIV : PACKAGING AND PREPARING FOR MAILING

INTERACTION ITEMS:

1. How does sorting mail speed its delivery?
2. What are the limitations on size of cards? Envelopes? Packages?
3. Is kraft tape secure enough for mailing?
4. What are the classes of postage for mailing?
5. Why is bulk mailing cheaper?
6. How is zip plus 4 cheaper?
7. What does presorting eliminate?
8. What are the postal requirements for labeling boxes?
9. What procedure should be used to deliver a printed job?
10. What protection does the printer get from good record keeping?
11. How should a job that is to be picked up differ from delivered jobs?
12. Why enclose a packing slip with the shipment or delivery?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Visit a mailroom at the post office to learn how packages are sorted, handled, and bagged for shipping.
2. Have a postal official visit the class to explain the use of a postage meter.
3. Take the responsibility for sorting outgoing mail at your institution for a week.
4. Write down the information and design a delivery receipt for a printing plant.

5. List information that should be contained in a journal of jobs that are picked up at the printing plant.

6. Plan the mailing of 1000 pieces for a direct-mail campaign in a one-state area.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIV : PACKAGING AND PREPARING FOR MAILING

EVALUATION ITEMS:

Fill in the blanks with the correct answers.

1. List three advantages of presorting mail.

   a.

   b.

   c.

2. What is the minimum size of a card and the minimum thickness of stock?

   a. Size:

   b. Thickness:

3. List three types of information necessary on delivery slips.

   a.

   b.

   c.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XIV : PACKAGING AND PREPARING FOR MAILING

ANSWERS TO EVALUATION ITEMS:

1. The student may list any three of the following:

   a. Cheaper postage
   b. Faster
   c. Less chance for lost pieces
   d. Less chance for damaged pieces
2. a. 3-1/2" x 5"
   b. .007" thick
3. The student may list any three of the following:

   Signature of deliverer
   Signature of recipient
   Place (room) of delivery
   Date of delivery
   Number of packages delivered

HO 1

BULK MAILINGS

In order for a bulk third-class mailing to qualify for the discount rate, the following requirements and instructions are given:

REQUIREMENTS

1) 200 or more identical pieces
2) permit number must be printed or stamped on each mailing piece
3) piece of paper, size of mail piece; write "Mixed States," rubber-band on top
4) must have an exact piece count

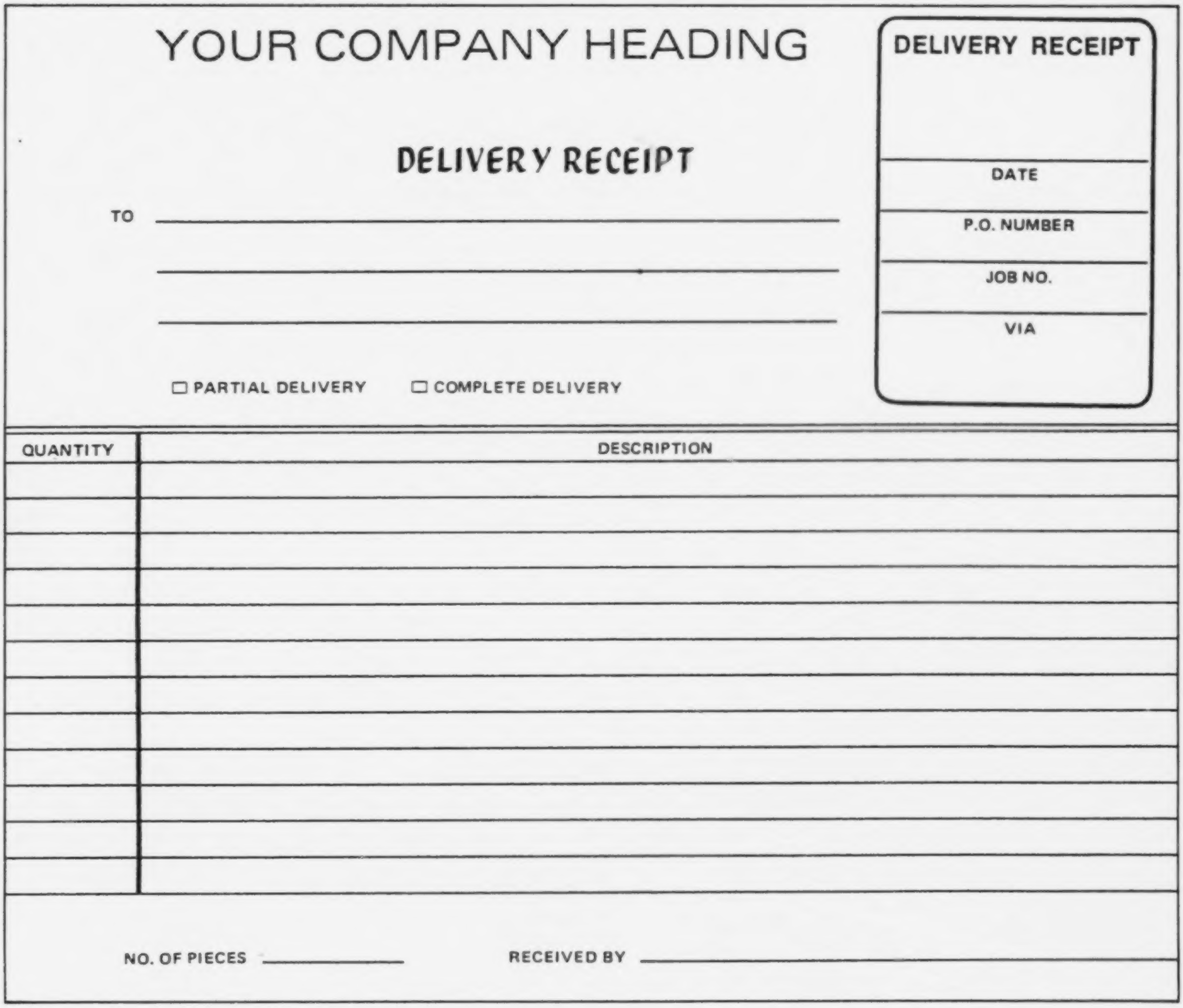
LABELING SACKS

Sacks must be labeled as to their destination. Labels are to be filled out as follows:

line one--post office location to be sent
line two--3C ltrs
line three--mailing station

HO 2

Delivery Receipt



YOUR COMPANY HEADING

DELIVERY RECEIPT

TO ______________________________

____

____

☐ PARTIAL DELIVERY ☐ COMPLETE DELIVERY

DELIVERY RECEIPT

DATE

P.O. NUMBER

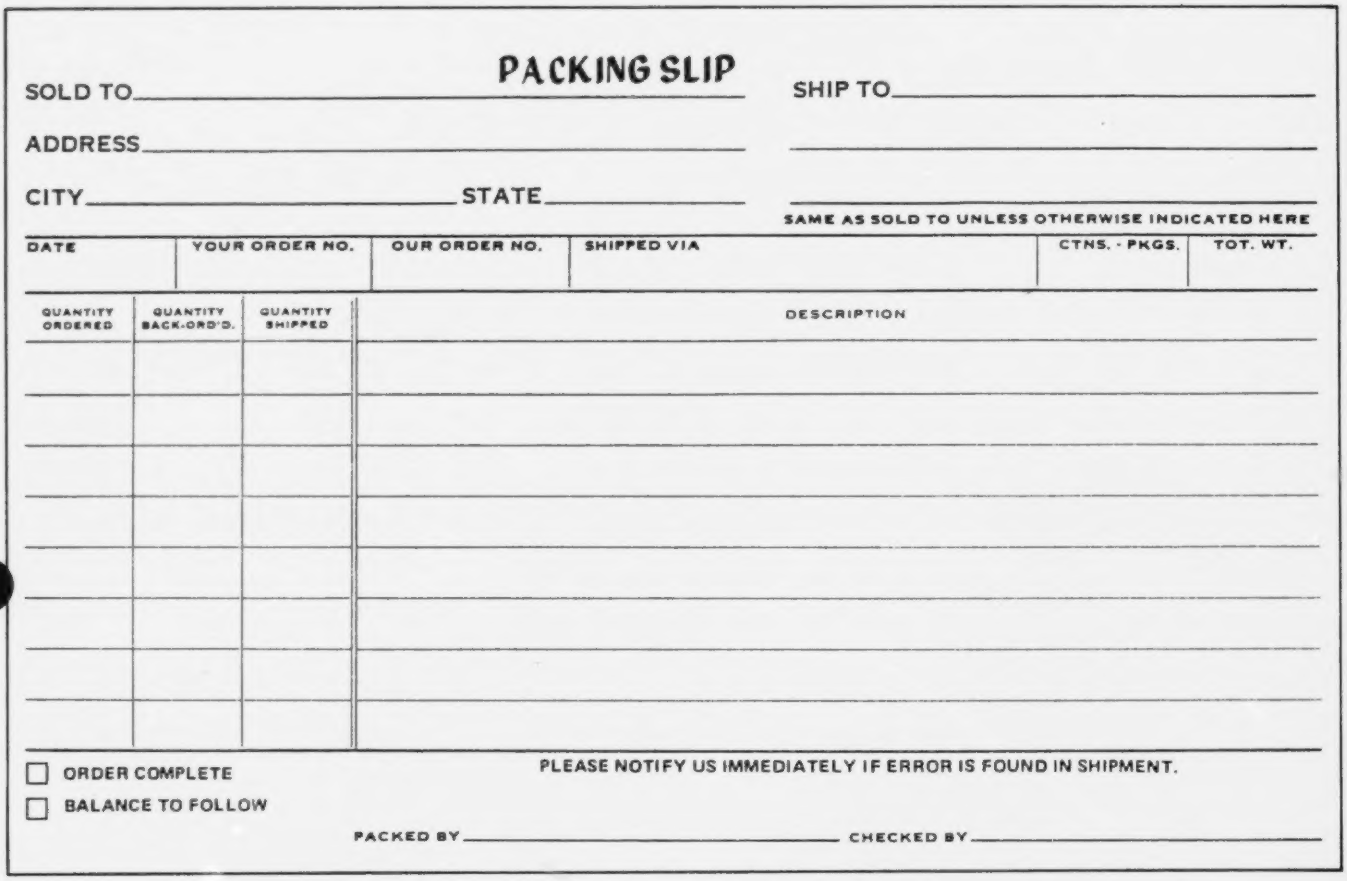
JOB NO.

VIA

QUANTITY	DESCRIPTION

NO. OF PIECES ____________ RECEIVED BY ______________________________

Packing Slip



PACKING SLIP

SOLD TO ______________________________ SHIP TO ______________________________

ADDRESS ______________________________ ______________________________

CITY ______________ STATE ______________ ______________________________

SAME AS SOLD TO UNLESS OTHERWISE INDICATED HERE

DATE	YOUR ORDER NO.	OUR ORDER NO.	SHIPPED VIA	CTNS. - PKGS.	TOT. WT.

QUANTITY ORDERED	QUANTITY BACK-ORD'D.	QUANTITY SHIPPED	DESCRIPTION

☐ ORDER COMPLETE

☐ BALANCE TO FOLLOW

PLEASE NOTIFY US IMMEDIATELY IF ERROR IS FOUND IN SHIPMENT.

PACKED BY ______________________________ CHECKED BY ______________________________

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

SCOPE OF UNIT:

Specialty operations are finishing touches either necessary or desired to enhance the printed product. Some of these operations can be done on a press; more often they require a separate piece of equipment or operation. This unit will include numbering, die cutting, perforation and scoring, and thermography and laminating. Preventive maintenance of equipment is also included in this unit.

INFORMATION TOPIC: XV-1 OR DEMONSTRATION:

NUMBERING

(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify types of numbering machines used in the printing processes.
2. Identify functions of parts on numbering machines.
3. Identify uses for different types of numbering machines.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Relief Numbering Machine
2. HO 2: Web Numbering Machine System

INFORMATIONAL ASSIGNMENT: (Student)

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch. 21, p. 543.

REFERENCES:

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch. 21, p. 543.

INTRODUCTION:

Numbering forms, tickets and other types of printing is a finishing operation that requires careful attention at the press. If the sheet is fed crookedly, a double may be printed. Should the numbering machine malfunction, the job will be out of sequence and may have to be reprinted. There are many types of numbering systems, from hand numbering to multiple systems. This lesson will deal with numbering on the offset press and on the platen press.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

OUTLINE: (Key Points)

I. Types of Numbering Machines

   A. Hand-held - hand-held numbering machines are ideal for office situations where very short sequences are necessary

   B. Electric - numbering machines that forms numbers in a variety of sequences, usually with a trip to activate the machine

   C. Relief - numbering machines used in the relief process to number large quantities of material in a variety of sequences (HO 1)

      1. Forward numbering - numbering beginning with the lowest number and working up

      2. Reverse numbering - numbering beginning with the highest number and ending with the lowest; process leaves the first number on top

      3. Skip numbering - numbering in any of a variety of sequences other than consecutive; process is used when printing multiple copies

      4. Mirror image numbering - numbering with a reverse image enabling the number to be correct when displayed in a window

   D. Rotary - numbering with a rotary press requiring special machines (HO 2)

      1. Regular - used when numbers run across the cylinders of the press

      2. Convex - used when numbers are to be printed around the cylinder

II. Parts of Numbering Machines

   A. Plunger - the pressure point which allows the number to change; the surface of the plunger may be rectangular or have the letters "No." on it

B. Pawl - the mechanism which turns the wheels on the machine

C. Wheels - the wheels that have the numbers 0 thru 9 around the circumference of the surface; there may be 5 to 9 wheels per machine

D. Shaft - holds the wheel, and activates the pawl and plunger

E. Sinkable "O" - a feature that allows unnecessary O's to be below the printing surface

III. Size of Machines - the size of the number is limited to 1/4" without special equipment because of the circumference of the wheels

IV. Frisket - a special jig which allows the plunger to print on the frisket rather than on the stock

V. Summary and Conclusion

A. Types of numbering systems

B. Parts of numbering machines

C. Size of machines

D. Frisket

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

INTERACTION ITEMS:

1. Why would a job require "crash" numbering?
2. How can we number multiple copies of a form on a single sheet?
3. How can the "No." be printed on the sheet?
4. What problems are present with reverse numbering?
5. Why is careful attention on the press necessary?
6. What is a "frisket"?
7. Why is maintenance of numbering machines so important?
8. How does the number advance to the next number?
9. What kind of problems are encountered as the size of the number gets larger?
10. Why use a convex machine for numbering parallel to the sheet?
11. Why use a straight machine when numbering across the sheet?
12. How is the plunger activated?
13. How is the machine inked?
14. How many wheels are on most machines?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Find samples of jobs that have been numbered and compare the different styles of numbers.
2. Number several sheets of paper consecutively and notice that the largest number is on top. By using reverse numbering machines the lowest number is on top.
3. Identify these parts of a machine and explain their purpose:
   a. Plunger
   b. Pawl
   c. Wheels (how many)

4. Demonstrate a relief numbering machine to illustrate forward and reverse numbering, sinkable "O", and blinding the "No." on the plunger. Use of two machines, one set forward and the other set in reverse, is ideal. Use of a skip wheel machine will also enhance the demonstration.

   a. Lock-up machine(s) in chase; prepare press.

   b. Position on sheet.

   c. Construct frisket* to blind "No."

   d. Sink "O" on forward machine.

   e. Set number of wheels on side of frame for reverse machine.

   f. Print 100 copies.

   g. Discuss problems associated with each type of machine.

*Frisket should be index stock attached to gripper fingers, allowing number to print on stock; the "No." prints on the frisket. Less packing may be necessary.

5. If no equipment is available for this activity, a field trip to an offset plant that does numbering on offset presses is encouraged.

LESSON PLAN: 1

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

EVALUATION ITEMS:

1. List four types of numbering machines.

   a.

   b.

   c.

   d.

For each of the following, write "T" if the statement is true, or "F" if it is false.

____ 2. Most numbering machines have four rows of wheels.

____ 3. The same numbering machine can number forward or reverse.

____ 4. A frisket is used to block out an inked plunger.

____ 5. Large size numbers are easier to print than small size numbers.

____ 6. A convex numbering machine is ideal for a relief press.

____ 7. A straight numbering machine is used parallel on an offset press.

____ 8. A sinkable "O" is not a big problem on a forward machine.

____ 9. The plunger advances the number.

____10. A skip wheel machine is used for printing multiple copies.

____11. Electric machines are best for short orders.

LESSON PLAN: 1

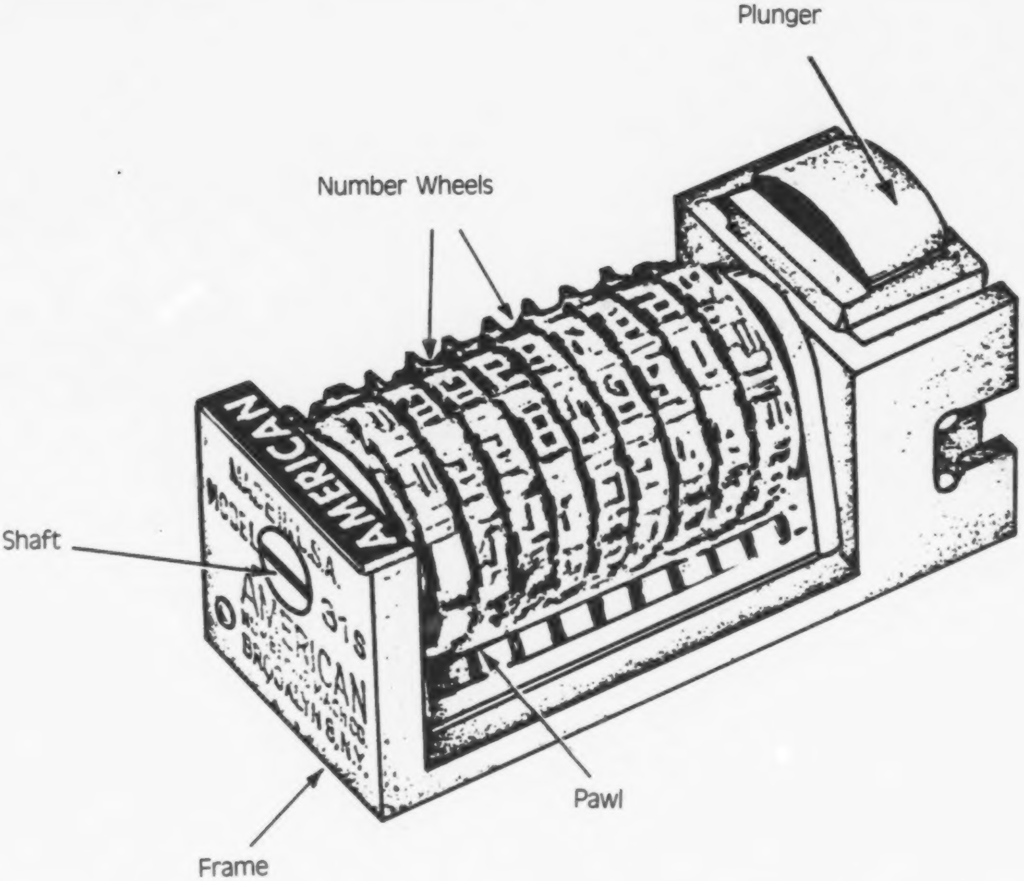
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV: SPECIALTY OPERATIONS

ANSWERS TO EVALUATION ITEMS:

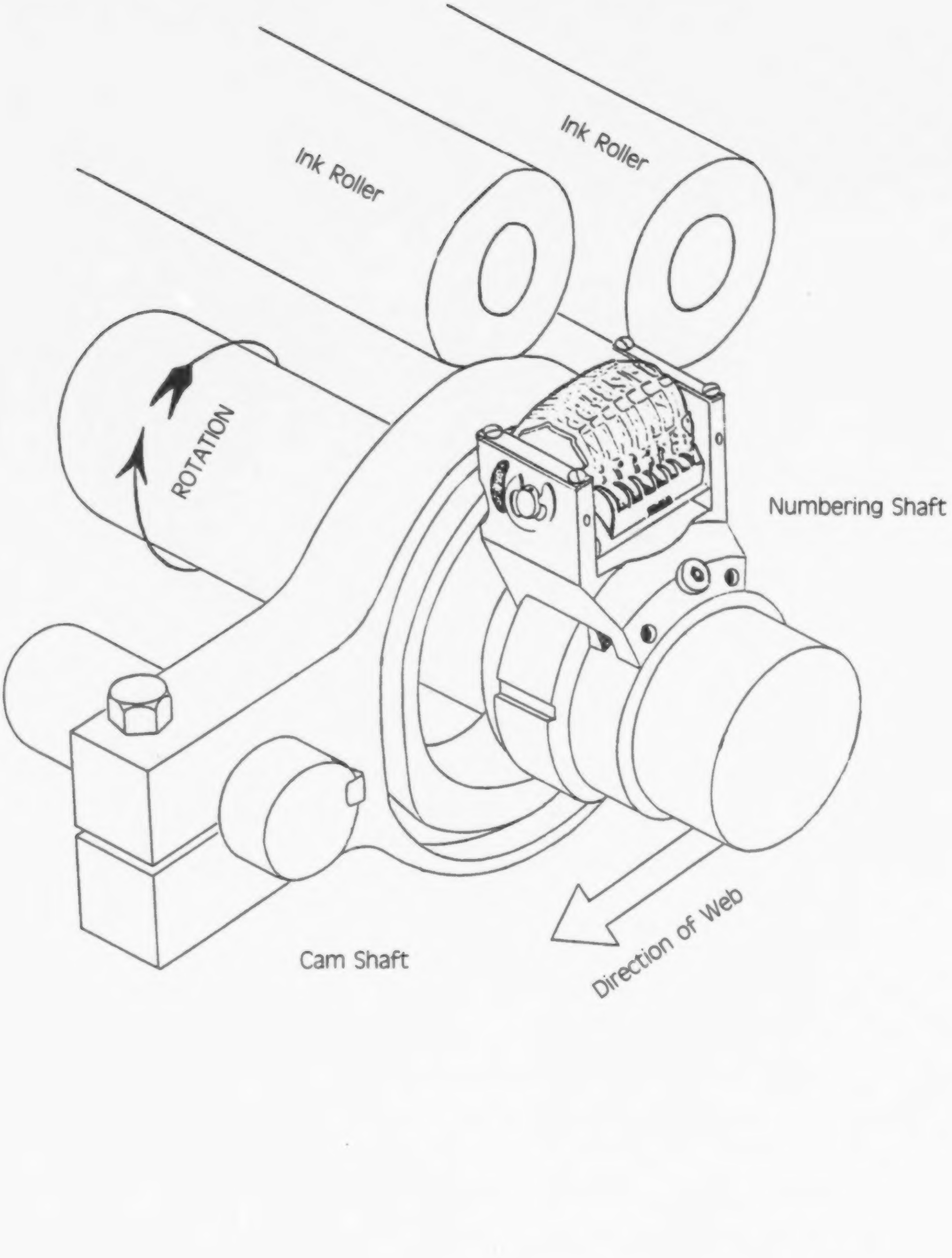
1. a. Hand-held
   b. Electric
   c. Relief
   d. Rotary
2. F
3. T
4. T
5. F
6. F
7. F
8. T
9. T
10. T
11. T

Relief Numbering Machine


Plunger
Number Wheels
AMERICAN
Shaft
MADE IN U.S.A.
MODEL
AMERICAN
31S
AMERICAN
BROOKLYN, N.Y.
Pawl
Frame

1132

Web Numbering Machine System


Ink Roller
Ink Roller
ROTATION
Numbering Shaft
Cam Shaft
Direction of Web

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

SCOPE OF UNIT:

Specialty operations are finishing touches either necessary or desired to enhance the printed product. Some of these operations can be done on a press; more often they require a separate piece of equipment or operation. This unit will include numbering, die cutting, perforation and scoring, and thermography and laminating. Preventive maintenance of equipment is also included in this unit.

INFORMATION TOPIC: XV-2 AND DEMONSTRATION: XV-2

DIE CUTTING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify the parts of a die.
2. Identify steps in die cutting on a press.
3. Identify the problems associated with die cutting.
4. Perform die cutting according to the steps of procedure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Parts of a Simple Die
2. HO 2: Die Cutting Press
3. HO 3: Cutting and Creasing Die
4. Die
5. Platen press

INFORMATIONAL ASSIGNMENT: (Student)

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch. 21, pp. 541-543.

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 18, pp. 448-449.

REFERENCES:

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch. 21, pp. 541-543.

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 18, pp. 448-449.

INTRODUCTION:

Die cutting is growing in popularity as an advertising tool, creating a special effect with its irregular shape. Small die cutting and short runs can be done on a platen press with dies made in-shop. Most dies, however, are made by specialty houses and printed on a die cutting press.

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

OUTLINE: (Key Points)

I. Parts of a Die (HO 1)

  A. Base - the plywood part of the die that contains other parts

  B. Rule - a steel rule that is formed to the pattern required of the die; the rule is sharp on top and is usually about .918 in height

  C. Bridge - the gaps in the base to allow the rule to become stable

  D. Notch - cut areas in the bottom of the rule to allow it to fit in the base

  E. Sponge rubber - used to assist the release of the paper from the die

  F. Nick - a nick is made in the surface of the rule to hold excess paper in place after die cutting

II. Die Cutting on the Press (HO 2)

  A. Platen press - the platen press is often used for small die cutting and short runs

  B. Die cutting press - a special press made for die cutting, includes more press and weight, and is designed for large dies and a variety of die cutting

    1. Stripper - an attachment that removes the section of the paper that is waste

    2. Make-ready - the process of adjusting the pressure to make a clean cut and not dull the blade

III. Creasing die - used in the box making industry to provide a place to bend stock instead of cutting it (HO 3)

IV. Procedure for Die Cutting

A. Place steel plate on platen press.

B. Position sheet on plate.

C. Tape gauge pins to plate.

D. Adjust pressure (packing or platen screws).

E. Add make-ready under plate, if necessary.

V. Summary and Conclusion

A. Parts of a die

B. Die cutting on the press

C. Creasing die

D. Procedure for die cutting

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

INTERACTION ITEMS:

1. What industry relies heavily on die cut products?
2. What kinds of problems occur when stamping dies?
3. How do die cutting presses separate the waste stock?
4. How does the sponge rubber aid the press operator's job?
5. Why are the bridges important?
6. How are the rules bent to irregular shapes?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Examine a variety of products that have been die cut.
2. Using a die, print several copies of the die. Note and discuss problems encountered during the process. What problems were encountered that a die cutting press would not have?

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

EVALUATION ITEMS:

Place the correct answer listed below in the proper blank.

1. The gaps in the base are called ____________.
2. On a die cutting press the waste is removed by the ________.
3. The expensive portion of the die cutting process is forming the ________________.
4. The ________________ holds the paper in place after it has been cut.
5. A ___________________ is placed on the platen to protect it prior to die cutting.
6. Too much press pressure on the die rule _______________ the rule.
7. The bridges in the base are used to hold the base together. To make the die fit in the base, __________________ are made in the die.
8. The ____________________ on the die pushes the paper out of the die.
9. When die cutting a job that also requires folding, ________ rules are often used to make folding easier.
10. This folding operation requires extra _____________________ when preparing the press for operation.

ANSWERS:

Steel plate
Rubber
Notches
Die
Dulls

Make-ready
Creasing
Bridges
Stripper
Nick

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

EVALUATION ITEMS: NAME OF STUDENT:________________

DIE CUTTING

EQUIPMENT:

1. Die
2. Platen Press

DID THE STUDENT:	YES	NO
1. Place steel plate on platen press.		
2. Position sheet on plate.		
3. Tape gauge pins to plate.		
4. Adjust pressure (packing or platen screws).		
5. Add make-ready under plate if necessary.		

The student has satisfactorily completed the procedure "DIE CUTTING" according to the steps outlined.

____
Instructor's Signature
(Verifying Satisfactory Completion)

____
Date

LESSON PLAN: 2

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

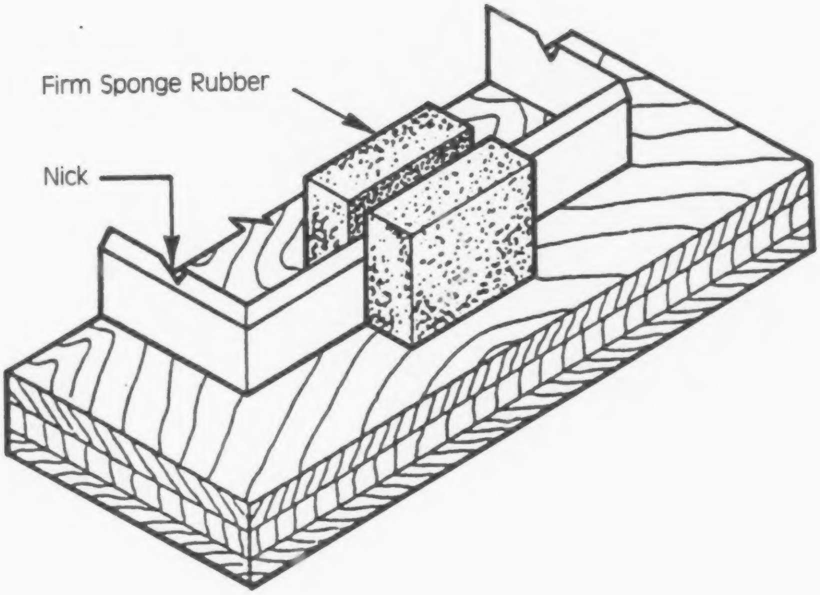
UNIT XV : SPECIALTY OPERATIONS

ANSWERS TO EVALUATION ITEMS:

1. Bridges
2. Stripper
3. Die
4. Nick
5. Steel Plate
6. Dulls
7. Notches
8. Rubber
9. Creasing
10. Make-ready

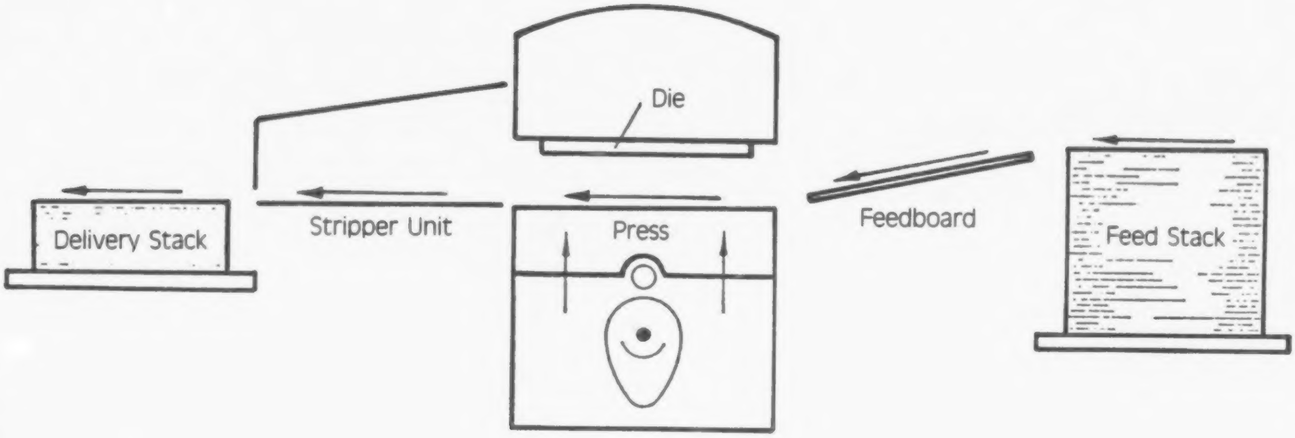
1141

Parts of a Simple Die


Firm Sponge Rubber
Nick

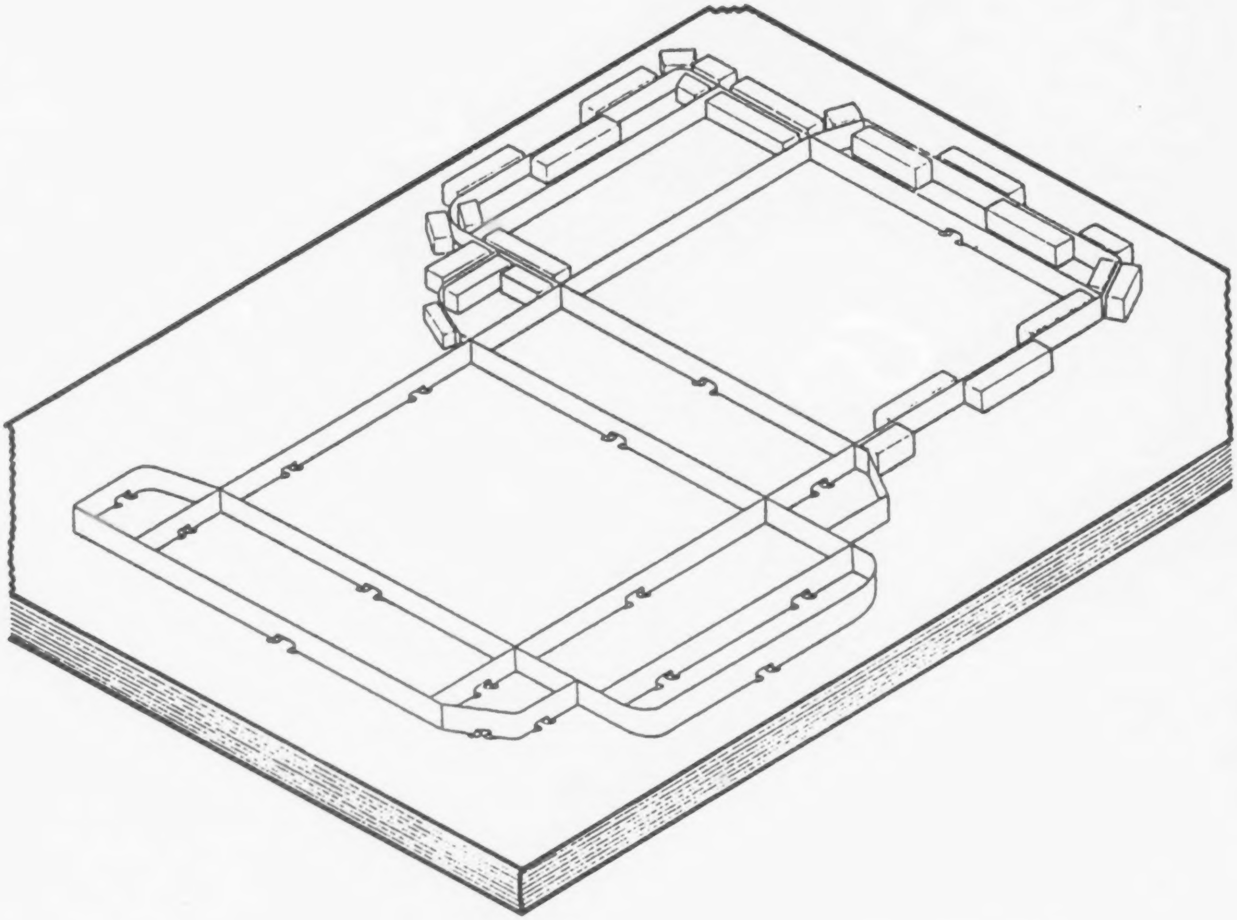
1142

Die Cutting Press


Die
Delivery Stack
Stripper Unit
Press
Feedboard
Feed Stack

1143

One Piece Cutting and Creasing Die



One piece cutting and creasing die for a single carton partially rubbered up.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV: SPECIALTY OPERATIONS

SCOPE OF UNIT:

Specialty operations are finishing touches either necessary or desired to enhance the printed product. Some of these operations can be done on a press; more often they require a separate piece of equipment or operation. This unit will include numbering, die cutting, perforation and scoring, and thermography and laminating. Preventive maintenance of equipment is also included in this unit.

INFORMATION TOPIC: XV-3 AND DEMONSTRATION: XV-3

PERFORATING/SCORING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify terminology associated with perforating and scoring operations.
2. Identify the proper method of perforation for the printed product.
3. Use a perforating rule on an offset press according to the steps of procedure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. TM 1: Types of Perforation
2. TM 2: Relief/Offset Perforation Rules
3. Offset Press
4. Litho-perf™

INFORMATIONAL ASSIGNMENT: (Student)

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982, ch. 18, pp. 448-449.

REFERENCES:

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 11, pp. 196-197.

INTRODUCTION:

Perforating and scoring has moved away from a manual operation to a faster, better automatic operation. The operations for small runs remain a letterpress job, however, offset can perforate and score on-line or at the folder. The principle for perforating and scoring is the same--the rule or wheel is different.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

OUTLINE: (Key Points)

I. Perforation - cutting slits in paper to facilitate tearing

   A. Types of perforations (TM 1)

      1. Pin hole - small round holes are punched in the stock

      2. Slit - slits are cut in the stock at the tear point; slits may vary in length and distance apart

      3. Run through - perforation that runs the full length of the stock

   B. Relief - small numbers of impressions and small perforations; uses rule that is type high (TM 2)

   C. Offset - used on impression cylinder of offset press for longer runs and run-through perforation (TM 2)

   D. Perforation machines - machines designed for perforation only; used for long runs and larger size stock; may be hand fed or automatically fed

   E. Folder perforation - perforation done on folder, either as perforation or to facilitate folding

II. Scoring - bending fibers in stock to facilitate folding

   A. Scoring rule - dull faced rule used only to bend paper fibers, not cut them

   B. Grain direction - scoring necessary for heavy stock when folding across the grain of paper

III. Procedure for Using Perforating Rule on an Offset Press

NOTE: Printing should be correctly positioned on the sheet and ready to print prior to beginning the steps of procedure.

A. Print copy on impression cylinder.

B. Apply Litho-perf™ to impression cylinder per instructions on package.

C. Adjust impression.

D. Check position.

E. Print (damage to the blanket should be expected).

IV. Summary and Conclusion

A. Perforation

B. Scoring

C. Procedure for using a perforating rule on an offset press

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

INTERACTION ITEMS:

1. What is the difference between scoring and perforating?
2. What are the limitations of perforation on an offset press?
3. What is being done when a job is scored?
4. What kind of stock usually requires scoring?
5. How is the grain direction of paper important in scoring a sheet?
6. What happens when too much pressure is used in perforating?
7. What types of perforation machines are there?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Using bristol or cover paper, fold stock both with the grain and against the grain. Which direction would scoring help?
2. Find a printed job that required scoring and fold the sheet the same direction. Check quality of fold that was scored and not scored.
3. Find samples of slit, slot, and round hole perforation. Measure number of openings per inch. Check other samples for the same ratio.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

EVALUATION ITEMS:

For each of the following, write "T" if the statement is true or "F" if it is false.

_____ 1. Scoring rule is the same as die cutting rule.

_____ 2. Perforation and scoring rules are applied to the impression cylinder of the offset press.

_____ 3. Grain direction can determine the need to score stock.

_____ 4. Too much pressure during perforation makes little difference.

_____ 5. Run-through perforation goes the entire length of the stock.

_____ 6. Perforation rules have a variety of slots per inch.

_____ 7. Pin hole perforation is the most common type of perforation.

_____ 8. Scoring is actually bending the fibers of the stock.

_____ 9. Heavy stock does not need to be scored.

_____10. Perforation machines are generally used for small numbers of copies.

LESSON PLAN: 3

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

EVALUATION ITEMS: NAME OF STUDENT:________________

USING A PERFORATING RULE ON AN OFFSET PRESS

EQUIPMENT:

1. Offset press
2. Litho-perf™

DID THE STUDENT:	YES	NO
1. Print copy on impression cylinder.		
2. Apply Litho-perf™ to impression cylinder per instructions on package.		
3. Adjust impression.		
4. Check position.		
5. Print.		

The student has satisfactorily completed the procedure "USING A PERFORATING RULE ON AN OFFSET PRESS" according to the steps outlined.

Instructor's Signature
(Verifying Satisfactory Completion)

Date

1151

LESSON PLAN: 3

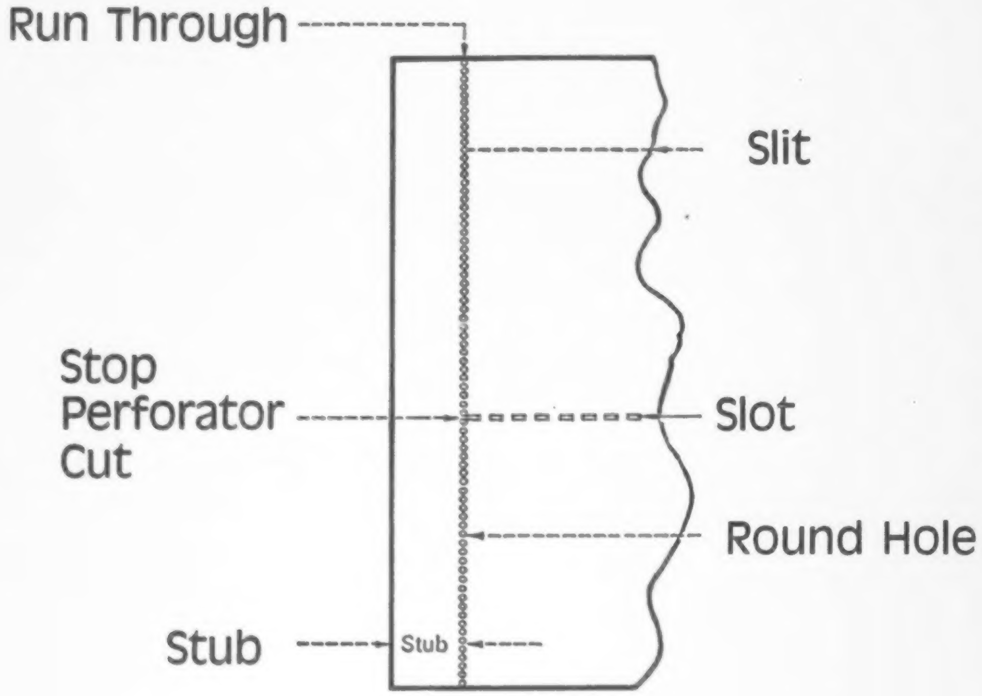
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

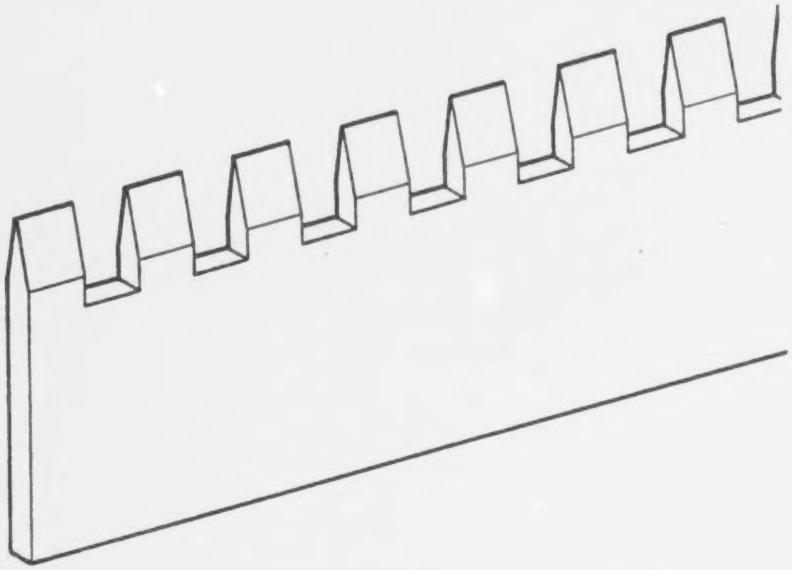
ANSWERS TO EVALUATION ITEMS:

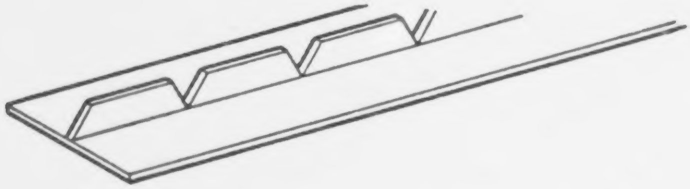
1. F
2. T
3. T
4. F
5. T
6. T
7. F
8. T
9. F
10. F

Types of Perforations


Run Through
Slit
Stop
Perforator
Cut
Slot
Round Hole
Stub
Stub

Relief/Offset Perforation Rules





LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

SCOPE OF UNIT:

Specialty operations are finishing touches either necessary or desired to enhance the printed product. Some of these operations can be done on a press; more often they require a separate piece of equipment or operation. This unit will include numbering, die cutting, perforation and scoring, and thermography and laminating. Preventive maintenance of equipment is also included in this unit.

INFORMATION TOPIC: XV-4 AND DEMONSTRATION: XV-4

THERMOGRAPHY/LAMINATING
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify key points in lamination.
2. Identify key points in thermography.
3. Produce a printed product using thermography according to the steps of procedure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Laminating Machines
2. HO 2: On-Line Thermography System
3. HO 3: Off-Line Thermography System
4. Virkotype™ powder
5. Hot plate

INFORMATIONAL ASSIGNMENT: (Student)

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983, sec. 14, pp. 365-367.

REFERENCES:

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980, unit 11, p. 197.

INTRODUCTION:

This lesson covers two of the most popular specialty operations, thermography and laminating. Increased technology has lowered what once was a high-cost operation, as much of the thermography is now done on-line. Laminating helps to protect valuable papers from the sometimes harmful effects of both weathering and tampering.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV: SPECIALTY OPERATIONS

OUTLINE: (Key Points)

I. Laminating (HO 1)

   A. Process using heat to cover stock with clean plastic

   B. Advantages

      1. Weathering - protects the paper and copy from moisture and air

      2. Tampering - protects the copy from tampering or altering

      3. Prestige - dresses up copy to present better appearance

II. Thermography - process of making printed copy three-dimensional

   A. Dusting powders - variety of powders which swell on the ink when heat is applied

      1. Colors - colors are used on matching ink

      2. Clear - clear powders, either shiny or dull, are used on existing inks

      3. Metallic - powders are used on colors that most closely match metallic color; i.e., gold on yellow; silver on gray; brass on deep yellow or orange

   B. Special powders - a wide range of special powders for special effects

   C. Heat - heat must be intense enough to melt dust and create a smooth surface

   D. On-line - dusting, vacuuming, and heating operations are performed as the product comes off the press (HO 2)

   E. Off-line - separate operation for thermography is done before ink on product dries (HO 3)

III. Procedure for Thermography

NOTE: Thermography can be done on-line with sophisticated equipment or with very basic equipment. This demonstration uses basic equipment of virkotype powder and a hot plate.

A. Print no more than 50 copies (relief process) or 25 copies (offset) at a time before applying powder.

B. Dip printing into Virkotype™ powder.

C. Remove excess powder by tapping paper.

D. Lay copies on flat surface (do not stack).

E. Hold copies over heat plate.

F. Powder will melt on printing.

G. Do not stack until cool.

IV. Summary and Conclusion

A. Laminating

B. Thermography

C. Procedure for thermography

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

INTERACTION ITEMS:

1. Thermography resembles what other type of printing?
2. Why is thermography sometimes called "fried printing"?
3. Why are both of these operations expensive?
4. Why is laminating an advantage to the stock?
5. What kind of printed material should be laminated?
6. What does lamination prevent?
7. What causes the printing to be raised in thermography?
8. Is the powder clear?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Find samples of laminated printing jobs. What kind of jobs are they?
2. Find samples of printing that has been thermographed. How many different colors can you find?

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

EVALUATION ITEMS:

For each of the following, write "T" if the statement is true or "F" if it is false.

_____ 1. Laminating seals the copy in plastic by shrinking.

_____ 2. Documents are laminated to prolong the life of the paper.

_____ 3. Plastic is usually applied only to the front of the printed piece.

_____ 4. Tampering with the printed copy is not easy if it has been laminated.

_____ 5. The printing expands when heat is applied for thermography.

_____ 6. The excess powder is brushed off the copy when done on-line.

_____ 7. Thermography powder is always shiny.

_____ 8. Gold Virkotype™ powder is dusted on blank ink.

_____ 9. Thermography machines need a variable speed.

_____10. The powder will adhere only to wet ink.

LESSON PLAN: 4

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

EVALUATION ITEMS: NAME OF STUDENT:________________

THERMOGRAPHY

EQUIPMENT:

1. Virkotype™ powder
2. Hot plate

DID THE STUDENT:	YES	NO
1. Print no more than 50 copies (relief process) or 25 copies (offset) at a time before applying powder.		
2. Dip printing into Virkotype™ powder.		
3. Remove excess powder by tapping paper.		
4. Lay copies on flat surface (do not stack).		
5. Hold copies over heat plate.		
6. Stack when cool.		

The student has satisfactorily completed the procedure "THERMOGRAPHY" according to the steps outlined.

____
Instructor's Signature
(Verifying Satisfactory Completion)

____
Date

LESSON PLAN: 4

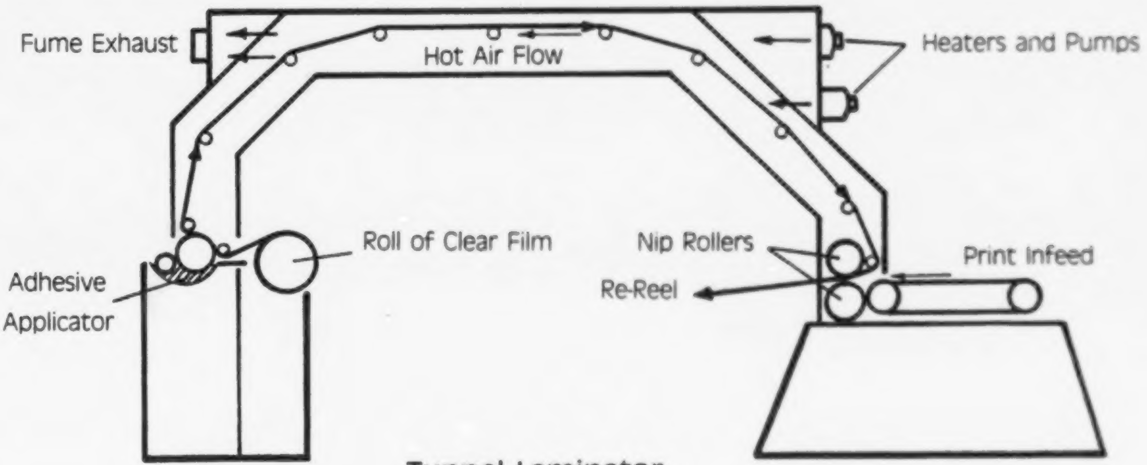
COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

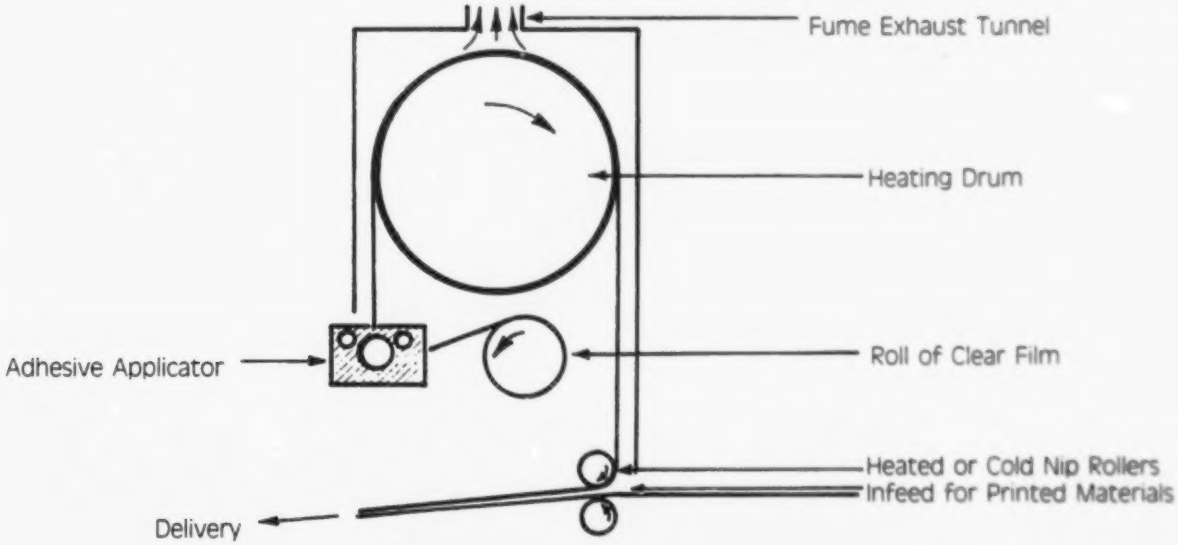
ANSWERS TO EVALUATION ITEMS:

1. F
2. T
3. F
4. T
5. F
6. F
7. F
8. F
9. T
10. T

Laminating Machines

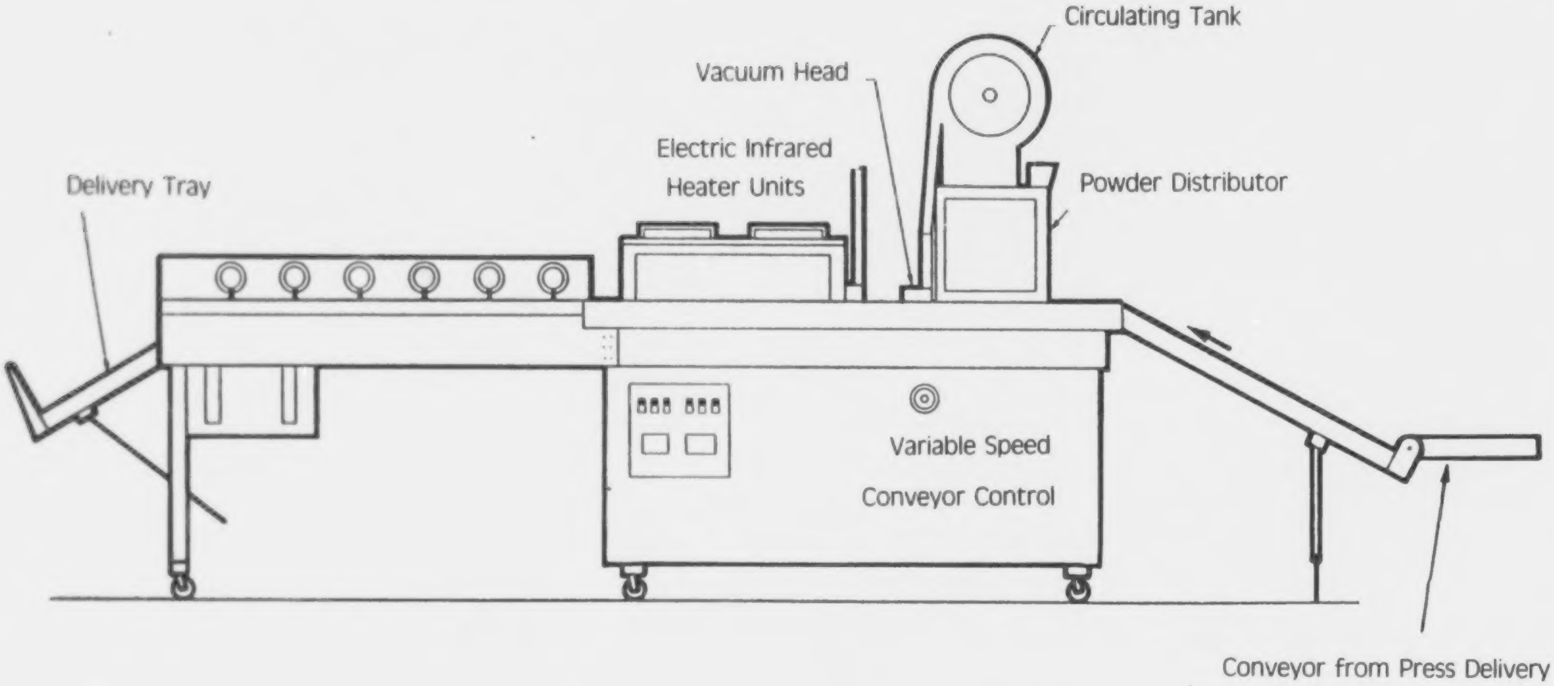

Fume Exhaust
Hot Air Flow
Heaters and Pumps
Roll of Clear Film
Nip Rollers
Print Infeed
Adhesive Applicator
Re-Reel

Tunnel Laminator

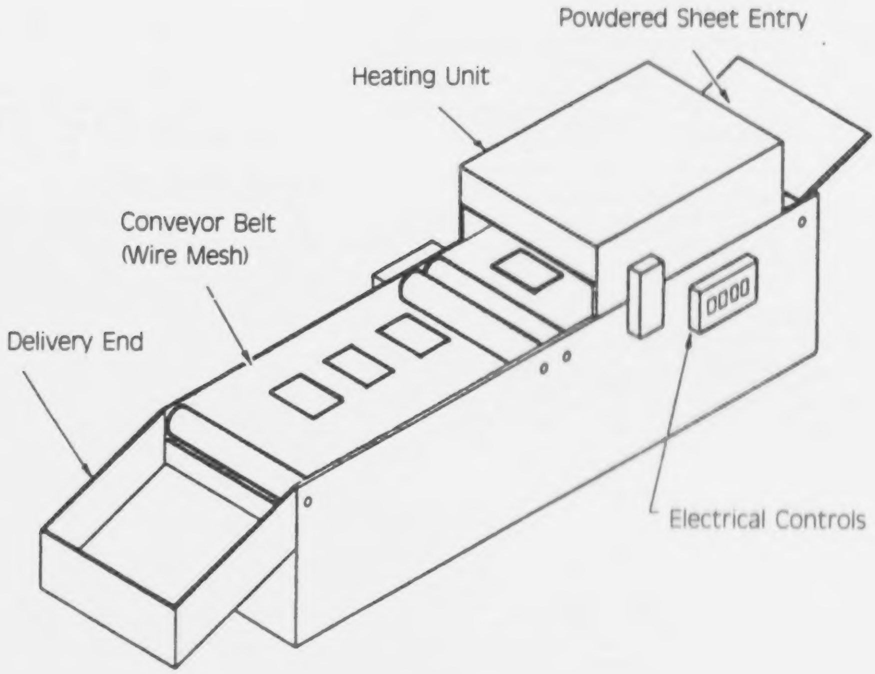

Fume Exhaust Tunnel
Heating Drum
Adhesive Applicator
Roll of Clear Film
Heated or Cold Nip Rollers
Infeed for Printed Materials
Delivery

Small Laminating Machine

On-Line Thermography System


Circulating Tank
Vacuum Head
Electric Infrared
Heater Units
Powder Distributor
Delivery Tray
Variable Speed
Conveyor Control
Conveyor from Press Delivery

Off-Line Thermography System


Powdered Sheet Entry
Heating Unit
Conveyor Belt
(Wire Mesh)
Delivery End
Electrical Controls

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

SCOPE OF UNIT:

Specialty operations are finishing touches either necessary or desired to enhance the printed product. Some of these operations can be done on a press; more often they require a separate piece of equipment or operation. This unit will include numbering, die cutting, perforation and scoring, and thermography and laminating. Preventive maintenance of equipment is also included in this unit.

INFORMATION TOPIC: XV-5 AND DEMONSTRATION: XV-5

PREVENTIVE MAINTENANCE
(Lesson Title)

LESSON OBJECTIVES - THE STUDENT WILL BE ABLE TO:

1. Identify key points of preventive maintenance.
2. Identify importance of good work habits.
3. Identify the advantages of a maintenance schedule.
4. Oil equipment according to the steps of procedure.

SUPPLEMENTARY TEACHING/LEARNING ITEMS:

1. HO 1: Maintenance Record
2. Flexible spout oil can
3. Rag
4. Grease gun
5. Grease

INFORMATIONAL ASSIGNMENT: (Student)

Spence, Wm. P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980, ch 16, pp. 385-386.

REFERENCES:

Latham, Charles W. Advanced Pressmanship. Pittsburgh, PA: Graphic Arts Technical Foundation, 1963, ch 9, pp. 54-62.

INTRODUCTION:

Maintenance of equipment is probably the single most important and most overlooked part of the printing industry. Equipment that is cared for on a scheduled basis costs less to operate than equipment that is cared for only when it breaks. This lesson stresses the need for good work and good maintenance habits.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY //

UNIT XV : SPECIALTY OPERATIONS

OUTLINE: (Key Points)

I. High Mortality Parts - parts of equipment that wear rapidly and require adjustments that need to be checked periodically

   A. Spare parts - parts that need to be kept on hand

      1. Fuses - a variety of fuses that fit the equipment in the plant

      2. Belts - a variety of belts for equipment

      3. Springs - a variety of springs to fit equipment

   B. Equipment manuals - an instruction and parts manual of each piece of equipment should be kept near the piece of equipment

   C. Repair information - the telephone number of repair person should also be kept near the press

II. Work Habits - creating safe, clean work habits reduces repair time on equipment

   A. Tools - tools should be kept in proper cabinets/drawers

   B. Rags - dirty rags should be kept in properly marked container

   C. Chemicals - chemicals must be in containers and properly identified

III. Maintenance Schedule (HO 1)

   A. Daily - daily maintenance should be done the same time each day

   B. Weekly - a scheduled time each week, usually first thing or last thing of the week, should be planned for maintenance

   C. Monthly - maintenance should not be done only when time is available; it should be a scheduled procedure

   D. Down-time - down-time for maintenance is not charged to the particular job being printed at that time

IV. Procedure for Oiling Equipment

NOTE: Too much oil can cause as much damage to equipment as too little. Many pieces of equipment have color-coded holes for daily, weekly, and monthly lubrication. Visual maintenance is all that is required on some parts. Emphasize to the student the importance of scheduled maintenance.

A. Begin at top/front of equipment.

B. Use flexible spout oil can and rag; wipe excess oil away with rag.

C. Oil oil holes, cams, etc.

D. Use grease/grease gun and rag where grease is required; wipe excess away.

E. Record on chart, date, and sign.

F. Note wear or damage to equipment and record and report to supervisor.

V. Summary and Conclusion

A. High mortality parts

B. Work habits

C. Maintenance schedule

D. Procedure for oiling equipment

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

INTERACTION ITEMS:

1. How are high mortality parts determined?
2. Why should a spare parts kit include high mortality parts?
3. How do good work habits aid preventive maintenance?
4. How does a scheduled time for maintenance save money?
5. Where is maintenance time charged?
6. How does good housekeeping make maintenance easier?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Construct a chart for daily maintenance on each piece of equipment.
2. Do the same for weekly and monthly maintenance.
3. Assign a student to do maintenance on each piece of equipment for a short period of time. Then assign student to another type of printing equipment.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

EVALUATION ITEMS:

For each of the following, write "T" if the statement is true or "F" if it is false.

_____ 1. High mortality parts are parts that do not need to be checked very often.

_____ 2. An oil can and a rag complement each other.

_____ 3. Oil can be used in place of grease.

_____ 4. Schedule parts changes even if the part appears to be in good condition.

_____ 5. Fuses and belts should be included in a spare parts' kit.

_____ 6. Operator's manuals should be kept in the office.

_____ 7. Good housekeeping usually means good maintenance.

_____ 8. Maintenance schedules are for office people only.

_____ 9. Daily maintenance should be done at the same time daily.

_____10. Maintenance is charged to the job the operator is working on at the time.

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

EVALUATION ITEMS: NAME OF STUDENT:________________

OILING EQUIPMENT

EQUIPMENT:

1. Flexible spout oil can
2. Rag
3. Grease gun
4. Grease

DID THE STUDENT:	YES	NO
1. Begin at top/front of equipment.		
2. Use flexible spout oil can and rag; wipe excess oil away with rag.		
3. Oil oil holes, cams, etc.		
4. Use grease/grease gun and rag where grease is required; wipe excess away.		
5. Record on chart, date, and sign.		
6. Note wear or damage to equipment and record and report to supervisor.		

The student has satisfactorily completed the procedure "OILING EQUIPMENT" according to the steps outlined.

____
Instructor's Signature
(Verifying Satisfactory Completion)

____
Date

LESSON PLAN: 5

COURSE TITLE: GRAPHIC ARTS - OFFSET LITHOGRAPHY

UNIT XV : SPECIALTY OPERATIONS

ANSWERS TO EVALUATION ITEMS:

1. F
2. T
3. F
4. T
5. T
6. F
7. T
8. F
9. T
10. F

MAINTENANCE RECORD

EQUIPMENT LOCATION	PREVENTATIVE MAINTENANCE & REPAIR			
	LUB DATE	CHECK-UP DATE	REPAIR DATE	REASON

ASSET NO.

DESCRIPTION

SERIAL NO.

BIBLIOGRAPHY

Adams, J. Michael and David D. Faux. Printing Technology. 2nd ed. North Scituate, MA: Breton Publishers, 1982.

Birkett, William H. Graphic Arts Estimating. Arlington, VA: Printing Industries of America, 1978.

Blair, Raymond N., ed. The Lithographer's Manual. 7th ed. Pittsburgh, PA: The Graphic Arts Technical Foundation, 1983.

Bureau, William H. What the Printer Should Know About Paper. Pittsburgh, PA: Graphic Arts Technical Foundation, 1982.

Cogoli, John E. Photo-Offset Fundmentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980.

Cogoli, John E., et al. Graphic Arts Photography. Pittsburgh, PA: Graphic Arts Technical Foundation, 1981.

Conover, Theodore E. Graphic Communications Today. St. Paul, MN: West Publishing Co., 1985.

Crow, Wendell C. Communication Graphics. Englewood Cliffs, NJ: Prentice-Hall Inc., 1986.

Dennis, Ervin A. Lithographic Technology. Indianapolis, IN: Bobbs-Merrill, 1980.

Dennis, Ervin A. and John D. Jenkins. Comprehensive Graphic Arts. 2nd ed. Indianapolis, IN: Bobbs-Merrill, 1983.

"Ink Troubleshooting Tips." American Printer. February 1982, pp. 40-44.

Kagy, Frederick D. and J. Michael Adams. Graphic Arts Photography. North Scituate, MA: Breton Publishers, 1983.

Labuz, Ronald. How to Typeset From a Word Processor. New York, NY: R.R. Bowker Co., 1984.

Latham, Charles W. Advanced Pressmanship. Pittsburgh, PA: Graphic Arts Technical Foundation, 1963.

Latimer, H.C. Advertising Production Planning and Copy Preparation for Offset Printing. 2nd ed. New York, NY: Directors' Book Co., 1969.

Martin, A.G. Finishing Process in Printing. Great Britain: W & J Mackey Limited, Chathan.

National Association of Printers and Lithographers. Paper Manager's Handbook. 780 Palisade Ave., Teaneck, NJ 07666, 1983.

Peck, Harold L. Stripping: The Assembly of Film Images. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

Pocket Pal. 13th ed. New York, NY: International Paper Co., 1983.

Porter, A.S. Lithographic Presswork. Pittsburgh, PA: Graphic Arts Technical Foundation, 1982.

Ruggles, Philip K. Printing Estimating. 2nd ed. North Scituate, MA: Breton Publishers, 1985.

Saltman, David. Production Planning and Impositions Simplified. Philadelphia, PA: North American Publishing, 1975.

Seybold, John W. The World of Digital Typesetting. Medina, PA: Sybold Publications, Inc., 1984.

Spence, William P. and David G. Vequist. Graphic Reproduction. Peoria, IL: Charles A. Bennett, 1980.

Strauss, Victor. The Printing Industry. Washington, DC: Printing Industries of America, 1967.

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1980.